THE CLEVELAND TWIST DRILL CO.

CATALOGUE THIRTY NINE

ESTABLISHED 1874 INCORPORATED 1904

THE CLEVELAND TWIST DRILL CO.

MANUFACTURERS OF

DRILLS, REAMERS, SOCKETS, COUNTERBORES, MILLS, SCREW EXTRACTORS, ARBORS, MANDRELS, HIGH SPEED TOOLS

CATALOGUE 39

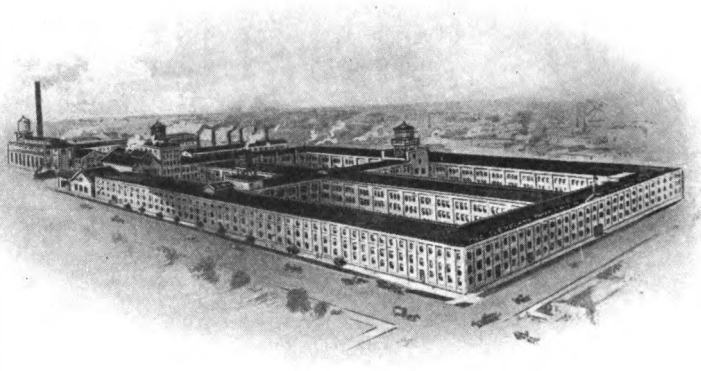
TRADE C MARK

FACTORY AND OFFICE — CLEVELAND, OHIO
NEW YORK SALESROOMS — 30 READE ST.
CHICAGO SALESROOMS — 9 N. JEFFERSON ST.

LONDON SALESROOMS — CLEVELAND TWIST DRILL CO., (GREAT BRITAIN) LTD., 36-37 UPPER THAMES STREET, LONDON, E. C. 4.

SECOND EDITION

ESTABLISHED 1874 INCORPORATED 1904



SIX ACRES OF MANUFACTURING FLOOR SPACE

THE MARK OF EXCELLENCE

TRADE MARK

THIS WILL ALWAYS IDENTIFY OUR TOOLS
REGISTERED IN UNITED STATES
PATENT OFFICE AND IN ALL
PRINCIPAL FOREIGN COUNTRIES

A Foreword to Our Friends

E hope you will find this volume a convenient handbook of "Cleveland" tools, and a ready guide not only to the tools themselves, but also to their best and most economical use.

Because we are a trifle proud of our product—and we hope with reason—and because we have confidence in its performance, it will be sincerely appreciated, should a "Cleveland" tool show defect, if you will return this tool to us for examination. Cheerful and equitable adjustment on any faulty tools will be made immediately.

We want our friends to feel, when they buy a "Cleveland" tool, that they are purchasing—not merely a tool—but a satisfactory number of drilled or reamed *holes*. Anything short of satisfaction on your part becomes an obligation on our part.

All our regular tools are shown—together with some special tools. But for the sake of brevity, we have omitted a few "specials," although we will be glad to furnish these as in the past.

We want you to feel free to make full use of our unusual facilities for the speedy and accurate production of your special requirements—either in quantities or singly. In such cases we will appreciate a sample of the tool itself or a detailed drawing, in order to insure an accurate understanding of your wishes.

We would like to become better acquainted with you, and we would like to have you become better acquainted with us. We hope you will accept this volume as an invitation to call upon us whenever we can be of service in any way whatsoever.

THE CLEVELAND TWIST DRILL COMPANY

NEW YORK CLEVELAND CHICAGO

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Bits

Cabinets

Chucks (See Sockets)

Collets

Counterbores Carbon and High Speed

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"Cleveland" Sockets

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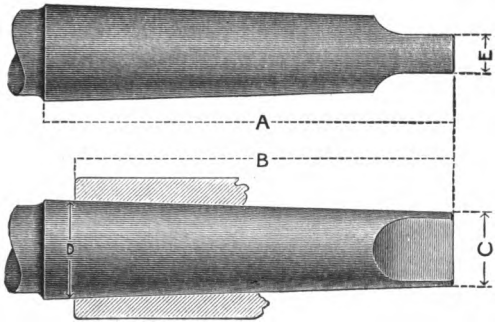
A broken tang need not mean a useless tool—just grind a new tang below the broken one and slip it into a "Perfect Double Tang" Socket. This will restore the tool to its original usefulness, with a driving strength 25 to 60 per cent. greater than before.

"Cleveland" Taper Shanks



DIMENSIONS

No.	A Inches	B Inches	C Inches	D Inches	E Inches	Taper in 12 Inches
1	$2\frac{11}{16}$	$2\frac{7}{16}$	.353	.475	$\frac{13}{64}$	.600 in.
2	$3\frac{3}{16}$	$2\frac{15}{16}$	.553	.700	$\frac{1}{4}$	.602 in.
3	$3\frac{15}{16}$	$3\frac{11}{16}$	.753	.938	$\frac{5}{16}$	.602 in.
4	$5\frac{1}{8}$	$4\frac{5}{8}$	.991	1.231	$\frac{15}{32}$	.623 in.
5	$6\frac{3}{8}$	$5\frac{7}{8}$	1.440	1.748	$\frac{5}{8}$	.630 in.
6	$8\frac{3}{4}$	$8\frac{1}{4}$	2.064	2.494	$\frac{3}{4}$	.626 in.

Steel Sockets for Taper Shank Tools
No. 100—Rough Sockets

Patented March, 1901

For Code Words See Page 235

Size No.	Price Each	Holds Tools Inches, Inclusive	Length Over All Inches	Diameter of Shank Inches
1	$1.20	1/4 to 9/16	7 1/2	1 1/8
2	1.80	19/32 " 29/32	8	1 1/4
3	2.50	15/16 " 1 1/4	10	1 1/2
4	4.00	1 9/32 " 2	12 1/2	2
5	7.50	2 1/16 " 3	16	2 3/4
6	14.00	3 1/16 " 4	19	3 3/4

No. 102 Fitted Sockets

Patented March, 1901

For Code Words See Page 236

Size No.	Description	Length Over All Inches	Price Each
1 to 2	Has No. 1 Hole and No. 2 Shank	6 3/4	$2.00
1 to 3	" " 1 " " " 3 "	7 1/2	2.50
1 to 4	" " 1 " " " 4 "	8 3/4	3.20
1 to 5	" " 1 " " " 5 "	10	4.80
2 to 2	" " 2 " " " 2 "	7 1/2	2.50
2 to 3	" " 2 " " " 3 "	8	2.50
2 to 4	" " 2 " " " 4 "	9 1/4	3.20
2 to 5	" " 2 " " " 5 "	10 3/4	4.80
3 to 2	" " 3 " " " 2 "	8 1/4	3.20
3 to 3	" " 3 " " " 3 "	9	3.20
3 to 4	" " 3 " " " 4 "	10	3.20
3 to 5	" " 3 " " " 5 "	11 1/2	4.80
4 to 3	" " 4 " " " 3 "	10 5/8	4.80
4 to 4	" " 4 " " " 4 "	11 5/8	4.80
4 to 5	" " 4 " " " 5 "	12 1/2	4.80
4 to 6	" " 4 " " " 6 "	16	12.00
5 to 4	" " 5 " " " 4 "	13 1/8	12.00
5 to 5	" " 5 " " " 5 "	14 1/2	12.00
5 to 6	" " 5 " " " 6 "	16	12.00

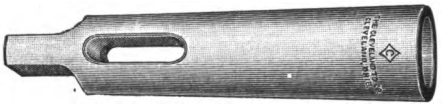
For dimensions of Taper Shanks, see pages 19, 205.

"SPEED AND FEED TABLE" ON PAGE 101

Steel Sockets for Taper Shank Tools

No. 104—Sleeve or Shell Sockets

Patented March, 1901



For Code Words See Page 236

Size No.	Description	Price Each
1 to 2	Has No. 1 Hole and outside fitting No. 2 Socket	$ 1.80
1 to 3	" " 1 " " " " " 3 "	2.40
1 to 4	" " 1 " " " " " 4 "	3.00
1 to 5	" " 1 " " " " " 5 "	4.40
2 to 3	" " 2 " " " " " 3 "	2.40
2 to 4	" " 2 " " " " " 4 "	3.00
2 to 5	" " 2 " " " " " 5 "	4.40
3 to 4	" " 3 " " " " " 4 "	3.00
3 to 5	" " 3 " " " " " 5 "	4.40
4 to 5	" " 4 " " " " " 5 "	4.40
4 to 6	" " 4 " " " " " 6 "	10.00
5 to 6	" " 5 " " " " " 6 "	10.00

For dimensions of Taper Shanks, see pages 19 and 205

No. 105—Drifts or Center Keys

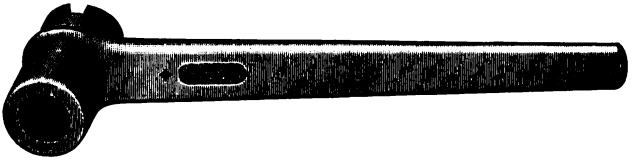
Drop Forged and Hardened

For Code Words See Page 236

Size No.	Description	Price Each
1	Fitting No. 1 Sockets and Sleeves.....	$ .30
2	" " 2 " " "	.35
3	" " 3 " " "	.40
4	" " 4, 5 and 6 Sockets and Sleeves.....	.50

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 94—Old Reliable Drill Holders



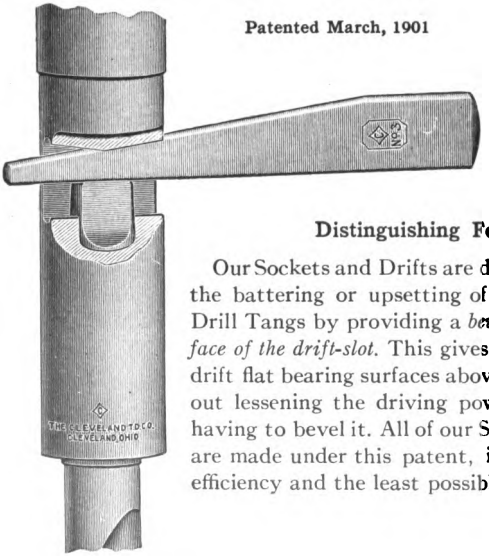
For Code Words See Page 235

Size No.	Price	Holds Taper Shank Drills Inches	Length Over All Inches	Weight Pounds
1	$0.80	1/8 to 9/16	8 1/2	1/2
2	1.00	19/32 " 29/32	10	1
3	1.20	15/16 " 1 1/4	11 3/4	2
4	1.40	1 9/32 " 2	14 1/4	4

In this Holder the lathe center enters the center hole in the shank of the drill, and consequently the drill must be in a true line with the centers of the lathe. If by accident, the hole in the shank of the drill has become marred or destroyed, use a holder one size larger than the shank of the drill and insert one of our sleeve sockets —putting the drill shank in the sleeve.

Sectional View Showing Construction of Our Patented Sockets with Drift Inserted

Patented March, 1901



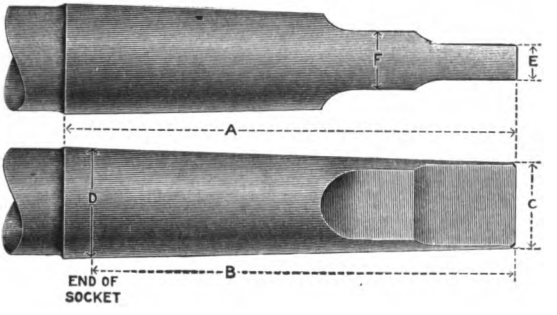
Distinguishing Feature

Our Sockets and Drifts are designed to prevent the battering or upsetting of the corners of the Drill Tangs by providing a *bevel in the upper surface of the drift-slot.* This gives the wedge-shaped drift flat bearing surfaces above and below, without lessening the driving power of the tang by having to bevel it. All of our Sockets and Sleeves are made under this patent, insuring increased efficiency and the least possible wear.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Double-Tang Shanks

For Code Words See Page 234



DIMENSIONS

No.	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	Taper per Foot Inches
1	2 11/16	2 7/16	.353	.475	13/64	1/4	.600
2	3 3/16	2 15/16	.553	.700	1/4	3/8	.602
3	3 15/16	3 11/16	.753	.938	5/16	1/2	.602
4	5 1/8	4 5/8	.991	1.231	15/32	5/8	.623
5	6 3/8	5 7/8	1.440	1.748	5/8	1	.630
6	8 3/4	8 1/4	2.064	2.494	3/4	1 1/4	.626

"Double-Tang" Shanks are designed to furnish a stronger taper shank drive without necessitating a revolutionary change in the dimensions of shanks or sockets. They will fit regular taper sockets but are intended for use with our "Perfect Double-Tang" Sockets shown on following pages.

They differ from regular taper shanks only in having a second and heavier tang (F, in above illustration) below the regular tang (E). The additional strength in this tang is shown in the above table.

All "Cleveland" Taper Shank tools will be furnished with "Double-Tangs" at regular prices and discounts. When ordering them give List Number and specify "Double-Tang." For Code Words, see page 234.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

"Perfect Double-Tang" Sockets for Taper Shank Tools

Patented March 26, 1901; October 9, 1906

"Perfect Double-Tang" Sockets have two driving slots instead of the usual one. They will hold taper shank tools so that the tangs cannot twist off; and in addition afford simple and easy means of restoring old tools with broken tangs to their original usefulness. They will fit any Spindle or Socket having a regular taper hole, and will nest into each other.

All "Cleveland" taper shank tools will be furnished with "Double-Tang" Shanks to fit these sockets at regular list prices and discounts. The lower tang is from 25% to 60% thicker than the original tang and correspondingly stronger. **It can be ground on any taper shank in from two to three minutes, and any tool scrapped on account of the original tang having been twisted off can thus be restored to its original usefulness.**

No. 81—"Perfect Double-Tang" Sleeve, or Shell Socket

For Code Words See Page 234

These Sleeves are slightly longer than our regular Sleeves. **They are regularly furnished with "Double-Tang" outside, but will be furnished with single tang outside, when so specified, at regular prices.**

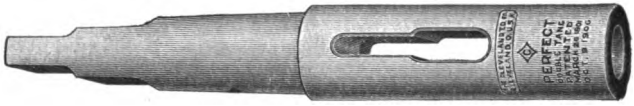
Size No.	Description	Price Each
1 to 2	Has No. 1 Hole and outside fitting No. 2 Socket	$ 1.80
1 to 3	" " 1 " " " " " 3 "	2.40
1 to 4	" " 1 " " " " " 4 "	3.00
1 to 5	" " 1 " " " " " 5 "	4.40
2 to 3	" " 2 " " " " " 3 "	2.40
2 to 4	" " 2 " " " " " 4 "	3.00
2 to 5	" " 2 " " " " " 5 "	4.40
3 to 4	" " 3 " " " " " 4 "	3.00
3 to 5	" " 3 " " " " " 5 "	4.40
4 to 5	" " 4 " " " " " 5 "	4.40
4 to 6	" " 4 " " " " " 6 "	10.00
5 to 6	" " 5 " " " " " 6 "	10.00

For dimensions of Taper Shanks, see pages 19 and 205

"THE USE OF HIGH SPEED DRILLS"—PAGE 94-96

No. 82—"Perfect Double-Tang" Fitted Socket

For Code Words See Page 234

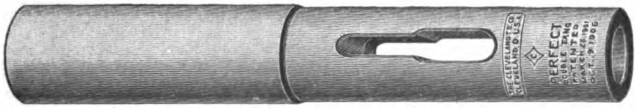


Size No.	Description	Length Over All Inches	Price Each
1 to 2	Has No. 1 Hole and No. 2 Shank	6¾	$ 2.00
1 to 3	" " 1 " " " 3 "	7½	2.50
1 to 4	" " 1 " " " 4 "	8¾	3 20
1 to 5	" " 1 " " " 5 "	10	4.80
2 to 2	" " 2 " " " 2 "	7½	2.50
2 to 3	" " 2 " " " 3 "	8	2.50
2 to 4	" " 2 " " " 4 "	9¼	3.20
2 to 5	" " 2 " " " 5 "	10¾	4.80
3 to 2	" " 3 " " " 2 "	8¼	3.20
3 to 3	" " 3 " " " 3 "	9	3.20
3 to 4	" " 3 " " " 4 "	10	3.20
3 to 5	" " 3 " " " 5 "	11½	4.80
4 to 3	" " 4 " " " 3 "	10⅝	4.80
4 to 4	" " 4 " " " 4 "	11⅝	4.80
4 to 5	" " 4 " " " 5 "	12½	4.80
4 to 6	" " 4 " " " 6 "	16	12.00
5 to 4	" " 5 " " " 4 "	13⅛	12.00
5 to 5	" " 5 " " " 5 "	14½	12.00
5 to 6	" " 5 " " " 6 "	16	12.00

For dimensions of Taper Shanks, see pages 19 and 205

No. 83—"Perfect Double-Tang" Rough Socket

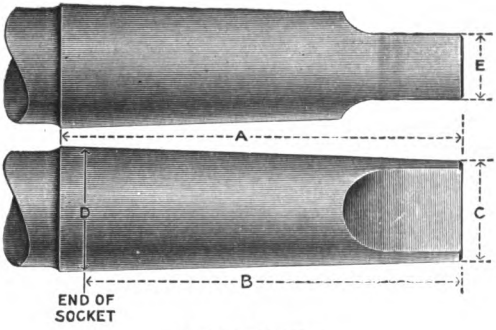
For Code Words See Page 234



Size No.	Price Each	Holds Tools Inches, Inclusive	Length Over All Inches	Diameter of Shank Inches
1	$ 1.20	¼ to 9/16	7½	1⅛
2	1.80	19/32 " 23/32	8	1¼
3	2.50	15/16 " 1¼	10	1½
4	4.00	1 9/32 " 2	12½	2
5	7.50	2 1/16 " 3	16	2¾
6	14.00	3 1/16 " 4	19	3¾

"INDICATION OF TOO GREAT SPEED"—PAGE 94

"Progress" Short Shanks



DIMENSIONS

No.	A Inches	B Inches	C Inches	D Inches	E Inches	Taper per Foot Inches
1	$2\frac{3}{16}$	2	.375	.475	$\frac{1}{4}$	.600
2	$2\frac{9}{16}$	$2\frac{3}{8}$	.581	.700	$\frac{3}{8}$	.602
3	$3\frac{1}{8}$	$2\frac{15}{16}$	.791	.938	$\frac{1}{2}$	.602
4	$4\frac{1}{16}$	$3\frac{13}{16}$	1.033	1.231	$\frac{5}{8}$	.623
5	$5\frac{1}{16}$	$4\frac{13}{16}$	1.495	1.748	1	.630
6	$7\frac{1}{16}$	$6\frac{3}{4}$	2.142	2.494	$1\frac{1}{4}$	.626

The "Progress" Short Shank is designed to furnish a stronger taper shank drive that will stand the hard service now demanded of tools—especially those of high speed steel.

It is of regular taper and the same length as a regular taper shank without the tang. Its tang is of the same size and strength as the lower tang of the "Double-Tang" Shanks on page 23. The above Table of Dimensions may therefore be followed in fitting with thicker and stronger tangs the shanks of drills from which the original tangs have been broken off.

"Progress" Short Shanks will not fit regular sockets or spindles. They must be used in "Perfect Double-Tang" or in "Progress" or other short sockets.

All "Cleveland" taper shank tools will be furnished with "Progress" Short Shanks at regular prices and discounts. When ordering them give List Number and specify "Progress" Shank.

For Code Words, see page 238.

"Progress" Short Taper Sockets and Sleeves

Patented March 26, 1901

No. 701—"Progress" Rough Socket

For Code Words See Page 238

This Socket has "Progress" Short Taper Hole and Rough Shank. It takes the same List Prices as No. 100 on page 20.

No. 703—"Progress" Fitted Sockets

For Code Words See Page 238

This Socket takes the same List Prices as No. 102 on Page 20

It has "Progress" Short Taper Hole and regular taper shank, but will be furnished with "Progress" Short Shank when so specified, as described below.

No. 706—"Progress" Shell Socket, or Sleeve

For Code Words See Page 238

This Sleeve takes the same List Prices as No. 104 on Page 21

It has "Progress" Short Taper Hole and regular taper shank, but will be furnished with "Progress" Short Shank when so specified, as described below.

"Progress" Short Sockets

"Progress" Short Sockets are for use with "Progress" Short Shanks, or for driving drills that have lost their original tang and been fitted with a new and heavier tang on the stub of the old shank.

In refitting drills in this way the table of dimensions on the opposite page should be followed.

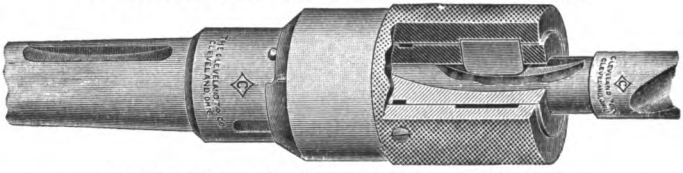
All "Cleveland" taper shank tools will be fitted with "Progress" Short Shanks at regular prices and discounts. When ordering them give List Number and specify "Progress" Shank. For Code Words, see page 238.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Cleveland Improved Grip Sockets

Patented Oct. 15, 1895

A Perfect Device for Driving Taper Shank Tools



Section cut away to show grip of key on the shank

This Grip Socket is designed to hold and drive Taper Shank Drills and other tools. A groove, which is an arc of a true circle, is milled in the shank of the drill or tool—as shown in above illustration—a key let into the body of the socket fits into the groove and is locked securely in place by a turn of the revolving internally eccentrically counterbored collar.

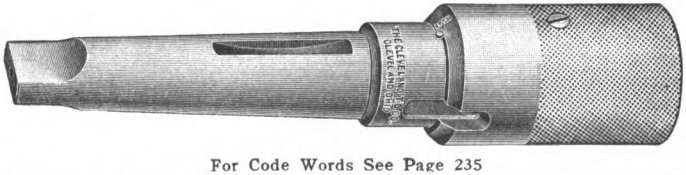
After the key is locked, it is impossible for the tool to slip in the socket, or to be pulled out, until the collar is turned back again to release the key. The end of the collar is beveled, and a plain index mark on it and on the body of the socket shows when the key is released.

To insert the drill, turn the collar till the two marks coincide, slip the shank into the socket with the keyway in the shank exactly under the index marks and turn the collar to the right or left till it bears solidly on the key. Drills or tools that have had the **tangs on the shanks twisted off** can be used in these Grip Sockets, successfully, and in this way the cost of the sockets can be saved many times annually. Boring bars for **under cutting** can be used without any danger of their pulling out of the sockets, and the labor and expense of turning over heavy pieces saved.

We keep in stock, cutters for milling the grooves in the shanks. Printed instructions for correctly cutting such grooves on opposite page.

All Drill Press Spindles should have our collar and key fitted to them to get the best results. We have fitted up many shops in this way and will cheerfully give any information desired.

Patented Oct. 15, 1895



For Code Words See Page 235

No. 89 A Sockets with Rough Shanks		No. 89 B Sockets with Fitted Shanks		No. 89 B Sockets with Fitted Shanks	
Size Hole No.	Price	Size Hole	Price	Size Hole	Price
1	$4.00	No. 1, fitted to No. 2 or No. 3	$4.50	No. 1, fitted to No. 4	$5.25
2	5.00	" 2, " " 3.....	5.50	" 1, " " 5	8.50
3	6.50	" 3, " " 4.....	7.00	" 2, " " 4	6.75
4	9.25	" 4, " " 5.....	10.00	" 2, " " 5	9.00
5	10.25	" 5, " " 6.....	14.50	" 3, " " 5	9.50

When ordering tools to be used in these sockets always specify **Grip Shank.**

ALWAYS GIVE LIST NUMBER WHEN ORDERING

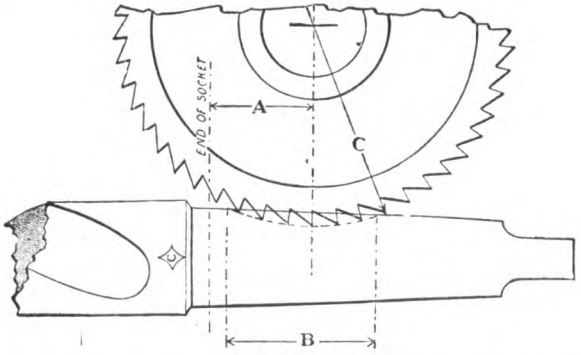
No. 88—Cutters for Grooving Taper Shanks for Cleveland Improved Grip Socket

For Code Words See Page 235

Size No.	Thickness Inches	Diameter Inches	Splining Taper Shanks No.
1	.161	4	1
2	.192	4½	2
3	.225	5	3
4	.288	5½	4
5	.350	6	5

All regular Stock Cutters have 1 inch holes

Method of Grooving Taper Shanks for Cleveland Improved Grip Socket



Shank Taper No.	A End of Socket to Center of Cutter Inches	B Length of Groove Inches	C Diameter of Cutter Inches	D Thickness of Cutter Inches
1	15/32	1 1/8	4	.161
2	11/16	1 3/8	4½	.192
3	29/32	1 3/4	5	.225
4	13/16	2	5½	.288
5	1 7/32	2 5/32	6	.350

Unscrew the three screws that secure the collar to the socket, when it will slide off. Remove the key from its slot, observing closely which way it goes, as it must not be reversed. Insert the shank to be grooved in the socket, and when it is pressed firmly home, mark on it with a scratch awl a line close up to the end of the socket. This is line marked "end of socket" in the above diagram, and fixes the position of the center of cutter. All measurements must be followed exactly.

Cleveland Oil Feeding Sockets

Patented Nov. 23, 1897

This Oil Feeding Socket marks a new departure in the use of Twist Drills when drilling in wrought iron or steel. A constant stream of oil is carried to the cutting lips of the drill and prevents its heating or sticking in the hole. The drills can be run at a much higher speed, and require sharpening less frequently. In a test of the advantages of using oil tube drills, one of our customers drilled through 55 feet of machinery steel with a $1\frac{1}{16}$-inch drill in twelve hours and did not grind the drill from start to finish. All you have to do is to hang a bucket, which has a stop cock near the bottom, over your drill press and connect it with the tube on the side of the socket. The collar should be held stationary by screwing on to it a piece of $\frac{1}{4}$-inch gas pipe and letting the pipe rest against the column of the machine. The oil is conveyed through channels, in the collar and in the body of the socket, into the orifices in the shank of the drill and so through the tubes of the drill to the point. These sockets hold the same sized drills as the ordinary sockets and the drills can be changed with equal facility.

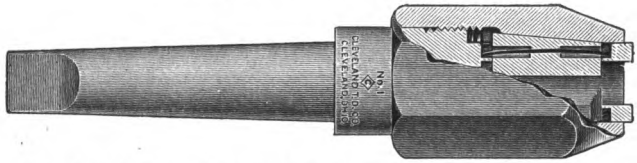
For Code Words See Page 235

No. 92 A Sockets with Rough Shanks		**No. 92 B** Sockets with Fitted Shanks		**No. 92 B** Sockets with Fitted Shanks	
Size Hole No.	**Price**	**Size Hole**	**Price**	**Size Hole**	**Price**
1	$4.00	No. 1, fitted to No. 2 or No. 3	$4.50	No. 1, fitted to No. 4	$5.25
2	5.00	" 2, " " 3.....	5.50	" 1, " " 5	8.50
3	6.50	" 3, " " 4.....	7.00	" 2, " " 4	6.75
4	9.25	" 4, " " 5.....	10.00	" 2, " " 5	9.00
5	10.25	" 5, " " 6.....	14.50	" 3, " " 5	9.50

When ordering Twist Drills to be used in these sockets specify **Oil Tube.** For Oil Tube Drills, see page 52.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Two-Jawed Grip Chucks



This chuck is designed to hold and drive Straight Shank Drills that have two opposite longitudinal V grooves in the shank and to overcome the serious objection found in such chucks heretofore put on the market.

Two jaws, let into opposite slots in the hollow body of the chuck, are contained within an internally-tapered collar. The collar is threaded to the body of the chuck and revolves on two straight bearings—one at each end of the tapered-jaw seat.

The exterior surface of the jaws has the same taper as the interior surface of the collar, so that the gripping edges of the jaws are always held parallel, and **grip the grooved shank firmly through their full length.**

The collar, or hood, entirely **covers the threaded parts,** and effectually **protects them from chips.**

The jaws are forced into the grooved-shank by revolving the hood to the **right** as in all ordinary chucks; they are released by revolving it to the **left.**

Hoods for sizes Nos. 0, ½ and 1, are hexagonal in form, and for Nos. 1½ and 2, octagonal.

No. 75—Two-Jawed Grip Chucks With Rough Shanks

For Code Words See Page 234

Size No.	Holds Two-Grooved Shank Drills Inches	Size Shank Inches	Price
0	3/32 to 15/64	1 x3 13/16	$ 4.50
½	1/4 " 1/2	1 3/16x3 13/16	5.25
1	1/4 " 3/4	1 5/8x5 1/8	6.00
1½	49/64 " 1 1/16	2 1/8x6 3/8	10.50
2	49/64 " 2 1/2	2 5/8x6 3/8	12.00

All Two-Grooved Shank Drills over 1½ inch diameter have shanks 1½ inch diameter to fit the No. 2 Chuck.

No. 77—Two-Jawed Grip Chucks With Taper Shanks

For Code Words See Page 234

Size No.	Holds Two-Grooved Shank Drills Inches	Shank Taper No.	Price
0	3/32 to 15/64	1	$ 5.00
0	3/32 " 15/64	2	5.00
½	1/4 " 1/2	1	5.75
½	1/4 " 1/2	2	5.75
½	1/4 " 1/2	3	5.75
1	1/4 " 3/4	2	6.75
1	1/4 " 3/4	3	6.75
1	1/4 " 3/4	4	6.75
1½	49/64 " 1 1/16	3	11.50
1½	49/64 " 1 1/16	4	11.50
1½	49/64 " 1 1/16	5	11.50
2	49/64 " 2 1/2	3	13.50
2	49/64 " 2 1/2	4	13.50
2	49/64 " 2 1/2	5	13.50

Always give List Number, Size and Number of Taper Shank when ordering. **Prices on** application for styles and sizes of Shanks other than regular.

"Cleveland" Drills

Carbon and

High Speed

Detailed Index—Pages 4 to 17

Hardening "Cleveland" Drills.

Taper Shank Drills

Carbon Steel No. 106

Code Word—LABEL

High Speed Steel No. 403

Code Word—LIBATE

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1/16	$0.45	$0.90	4 3/8	
5/64	.45	.90	4 1/2	
3/32	.45	.90	4 1/2	
7/64	.45	.90	4 5/8	
1/8	.45	.90	5 1/8	
9/64	.45	.90	5 1/4	
5/32	.45	.90	5 3/8	
11/64	.50	.90	5 3/4	
3/16	.50	.90	5 3/4	
13/64	.55	1.00	5 7/8	
7/32	.55	1.00	5 7/8	
15/64	.60	1.10	6 1/8	
1/4	.60	1.10	6 1/8	
17/64	.65	1.20	6 1/4	
9/32	.65	1.20	6 1/4	
19/64	.70	1.30	6 3/8	No. 1
5/16	.70	1.30	6 3/8	
21/64	.75	1.40	6 1/2	
11/32	.75	1.40	6 1/2	
23/64	.80	1.50	6 3/4	
3/8	.80	1.50	6 3/4	
25/64	.90	1.65	7	
13/32	.90	1.65	7	
27/64	1.00	1.75	7 1/4	
7/16	1.00	1.75	7 1/4	
29/64	1.10	1.90	7 1/2	
15/32	1.10	1.90	7 1/2	
31/64	1.20	2.00	7 3/4	
1/2	1.20	2.00	7 3/4	
33/64	1.30	2.15	8	
17/32	1.30	2.15	8	
35/64	1.40	2.25	8 1/4	
9/16	1.40	2.25	8 1/4	

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
37/64	$1.50	$2.40	8 1/2	
19/32	1.50	2.40	8 1/2	
39/64	1.60	2.50	8 3/4	
5/8	1.60	2.50	8 3/4	
41/64	1.70	2.75	9	
21/32	1.70	2.75	9	
43/64	1.80	3.00	9 1/4	
11/16	1.80	3.00	9 1/4	
45/64	1.90	3.25	9 1/2	
23/32	1.90	3.25	9 1/2	
47/64	2.00	3.50	9 3/4	
3/4	2.00	3.50	9 3/4	No. 2
49/64	2.10	3.75	9 7/8	
25/32	2.10	3.75	9 7/8	
51/64	2.20	4.00	10	
13/16	2.20	4.00	10	
53/64	2.40	4.40	10 1/4	
27/32	2.40	4.40	10 1/4	
55/64	2.60	4.75	10 1/2	
7/8	2.60	4.75	10 1/2	
57/64	2.80	5.15	10 5/8	
29/32	2.80	5.15	10 5/8	
59/64	3.00	5.50	10 3/4	
15/16	3.00	5.50	10 3/4	
61/64	3.25	5.90	10 7/8	
31/32	3.25	5.90	10 7/8	
63/64	3.50	6.25	11	
1	3.50	6.25	11	No. 3
1 1/64	3.75	6.75	11 1/8	
1 1/32	3.75	6.75	11 1/8	
1 3/64	4.00	7.25	11 1/4	
1 1/16	4.00	7.25	11 1/4	
1 5/64	4.25	7.75	11 1/2	
1 3/32	4.25	7.75	11 1/2	

Continued on next page

SAVE THE COST OF SPECIAL SHANKS—SEE PAGE 200

Taper Shank Drills

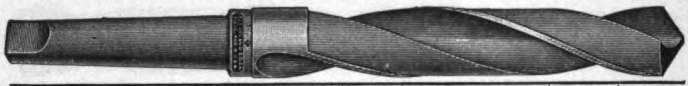
(Continued)

Carbon Steel No. 106

Code Word—LABEL

High Speed Steel No. 403

Code Word—LIBATE



Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1 7/64	$4.50	$8.25	11¾	
1⅛	4.50	8.25	11¾	
1 9/64	4.75	8.90	11⅞	
1 5/32	4.75	8.90	11⅞	
1 11/64	5.00	9.50	12	
1 3/16	5.00	9.50	12	No. 3
1 13/64	5.25	10.15	12⅛	
1 7/32	5.25	10.15	12⅛	
1 15/64	5.50	10.75	12½	
1¼	5.50	10.75	12½	
1 17/64	5.75	11.50	14⅛	
1 9/32	5.75	11.50	14⅛	
1 19/64	6.00	12.25	14¼	
1 5/16	6.00	12.25	14¼	
1 21/64	6.25	13.00	14⅜	
1 11/32	6.25	13.00	14⅜	
1 23/64	6.50	13.75	14½	
1⅜	6.50	13.75	14½	
1 25/64	7.00	14.65	14⅝	
1 13/32	7.00	14.65	14⅝	
1 27/64	7.50	15.50	14¾	
1 7/16	7.50	15.50	14¾	No. 4
1 29/64	8.00	16.40	14⅞	
1 15/32	8.00	16.40	14⅞	
1 31/64	8.50	17.25	15	
1½	8.50	17.25	15	
1 33/64	9.00	18.15	15⅛	
1 17/32	9.00	18.15	15⅛	
1 35/64	9.50	19.00	15¼	
1 9/16	9.50	19.00	15¼	
1 37/64	10.00	20.00	15⅜	
1 19/32	10.00	20.00	15⅜	
1 39/64	$10.50	$21.00	15½	
1 5/8	10.50	21.00	15½	
1 41/64	11.00	22.00	15⅝	
1 21/32	11.00	22.00	15⅝	
1 43/64	11.50	23.00	15¾	
1 11/16	11.50	23.00	15¾	
1 45/64	12.00	24.00	15⅞	
1 23/32	12.00	24.00	15⅞	
1 47/64	12.50	25.00	16	
1¾	12.50	25.00	16	
1 49/64	13.25	26.25	16⅛	
1 25/32	13.25	26.25	16⅛	
1 51/64	14.00	27.50	16¼	No. 4
1 13/16	14.00	27.50	16¼	
1 53/64	14.75	28.75	16⅜	
1 27/32	14.75	28.75	16⅜	
1 55/64	15.50	30.00	16½	
1⅞	15.50	30.00	16½	
1 57/64	16.25	31.25	16½	
1 29/32	16.25	31.25	16½	
1 59/64	17.00	32.50	16½	
1 15/16	17.00	32.50	16½	
1 61/64	17.75	33.75	16½	
1 31/32	17.75	33.75	16½	
1 63/64	18.50	35.00	16½	
2	18.50	35.00	16½	
2 1/64	19.25	36.25	16½	
2 1/32	19.25	36.25	16½	
2 3/64	20.00	37.50	17	
2 1/16	20.00	37.50	17	No. 5
2 5/64	20.75	38.75	17	
2 3/32	20.75	38.75	17	

Continued on next page

WHEN A TANG SNAPS, SEE PAGE 24

Taper Shank Drills

(Continued)

Carbon Steel No. 106

Code Word—LABEL

High Speed Steel No. 403

Code Word—LIBATE

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
2 7/64	$21.50	$40.00	17	
2 1/8	21.50	40.00	17	
2 9/64	22.25	41.25	17	
2 5/32	22.25	41.25	17	
2 11/64	23.00	42.50	17	
2 3/16	23.00	42.50	17	
2 13/64	23.75	43.75	17 1/2	
2 7/32	23.75	43.75	17 1/2	
2 15/64	24.50	45.00	17 1/2	
2 1/4	24.50	45.00	17 1/2	
2 17/64	25.25	47.50	17 1/2	
2 9/32	25.25	47.50	17 1/2	
2 19/64	26.00	50.00	17 1/2	
2 5/16	26.00	50.00	17 1/2	
2 21/64	26.75	52.50	18	
2 11/32	26.75	52.50	18	
2 23/64	27.50	55.00	18	
2 3/8	27.50	55.00	18	
2 25/64	28.25	57.50	18 1/2	
2 13/32	28.25	57.50	18 1/2	No. 5
2 27/64	29.00	60.00	18 1/2	
2 7/16	29.00	60.00	18 1/2	
2 29/64	29.75	62.50	19	
2 15/32	29.75	62.50	19	
2 31/64	30.50	65.00	19	
2 1/2	30.50	65.00	19	
2 33/64	31.25	67.50	19 1/4	
2 17/32	31.25	67.50	19 1/4	
2 35/64	32.00	70.00	19 1/4	
2 9/16	32.00	70.00	19 1/4	
2 37/64	33.00	72.50	19 1/2	
2 19/32	33.00	72.50	19 1/2	
2 39/64	34.00	75.00	19 1/2	
2 5/8	34.00	75.00	19 1/2	
2 41/64	35.00	77.50	20	
2 21/32	35.00	77.50	20	
2 43/64	36.00	80.00	20	
2 11/16	36.00	80.00	20	
2 45/64	$37.00	$82.50	20 1/2	
2 23/32	37.00	82.50	20 1/2	
2 47/64	38.00	85.00	20 1/2	
2 3/4	38.00	85.00	20 1/2	
2 49/64	39.25	87.50	20 1/2	
2 25/32	39.25	87.50	20 1/2	
2 51/64	40.50	90.00	20 1/2	
2 13/16	40.50	90.00	20 1/2	
2 53/64	41.75	92.50	21	
2 27/32	41.75	92.50	21	
2 55/64	43.00	95.00	21	No. 5
2 7/8	43.00	95.00	21	
2 57/64	44.25	97.50	21	
2 29/32	44.25	97.50	21	
2 59/64	45.50	100.00	21	
2 15/16	45.50	100.00	21	
2 61/64	46.75	102.50	22	
2 31/32	46.75	102.50	22	
2 63/64	48.00	105.00	22	
3	48.00	105.00	22	
3 1/16	52.00	112.50	22	
3 1/8	56.00	120.00	22	
3 3/16	60.00	127.50	22	
3 1/4	65.00	135.00	23	
3 5/16	70.00	142.50	23	
3 3/8	75.00	150.00	23	
3 7/16	80.00	157.50	23	
3 1/2	85.00	165.00	24	
3 9/16	91.00	172.50	24	No. 6
3 5/8	98.00	180.00	24	
3 11/16	105.00	187.50	24	
3 3/4	112.00	195.00	24	
3 13/16	119.00	202.50	24	
3 7/8	126.00	210.00	24	
3 15/16	133.00	217.50	24	
4	140.00	225.00	25	

"POINT GRINDING" ON PAGE 89

"PARAGON" DRILLS
HELPS AND HINTS
COUNTER SINKS
REAMERS
"PARADO REAMER
"PEERLES REAMER
MISCEL LANEO

Taper Shank Drills, Shanks Larger than Regular

Carbon Steel No. 107

Code Word—LABELITE

High Speed Steel No. 405

Code Word—LIBATTEN

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
5/16	$1.40	$2.80	6½	
11/32	1.40	2.80	6¾	
3/8	1.40	2.80	7	
13/32	1.40	2.80	7¼	
7/16	1.40	2.80	7½	No. 2
15/32	1.45	3.00	7¾	
1/2	1.50	3.00	8	
17/32	1.60	3.20	8¼	
9/16	1.70	3.20	8½	
19/32	2.50	4.60	9⅜	
5/8	2.50	4.60	9½	
21/32	2.50	4.60	9⅝	
11/16	2.60	4.60	9¾	
23/32	2.70	5.00	9⅞	No. 3
3/4	2.80	5.00	10	
25/32	2.90	5.00	10⅛	
13/16	3.00	5.45	10¼	
27/32	3.10	5.45	10⅜	
7/8	$3.20	$5.60	10½	No. 3
29/32	3.30	5.75	10⅝	
1⅛	5.40	10.50	12⅛	
1 5/32	5.60	10.80	12¼	
1 3/16	5.80	11.10	12½	No. 4
1 7/32	6.00	11.55	12¾	
1¼	6.20	12.00	13	
1¾	13.25	25.00	16½	
1 25/32	14.00	26.25	16½	
1 13/16	14.75	27.50	16½	
1 27/32	15.50	28.75	16½	
1⅞	16.25	30.00	16½	No. 5
1 29/32	17.00	31.25	16½	
1 15/16	17.75	32.50	16½	
1 31/32	18.50	33.75	16½	
2	19.25	35.00	16½	

64th sizes furnished at price of next larger size.

"DRILL BREAKAGE—A COMMON CAUSE"—PAGE 97

Straight Shank Drills, Long Set

Carbon Steel No. 110

Code Word—LABORLESS

High Speed Steel No. 415

Code Word—LIBERTY

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches
1/16	$0.45	$0.90	3 5/8	17/32	$1.50	$2.40	8 1/4
5/64	.45	.90	4	33/64	1.60	2.50	8 3/4
3/32	.45	.90	4 3/8	17/32	1.60	2.50	8 3/4
7/64	.45	.90	4 3/4	11/16	1.70	2.75	9
1/8	.45	.90	5 1/8	21/32	1.70	2.75	9
9/64	.45	.90	5 3/8	43/64	1.80	3.00	9 1/4
5/32	.45	.90	5 3/8	11/16	1.80	3.00	9 1/4
11/64	.50	.90	5 3/4	45/64	1.90	3.25	9 1/2
3/16	.50	.90	5 3/4	23/32	1.90	3.25	9 1/2
13/64	.55	1.00	5 7/8	47/64	2.00	3.50	9 3/4
7/32	.55	1.00	5 7/8	3/4	2.00	3.50	9 3/4
15/64	.60	1.10	6 1/8	49/64	2.10	3.75	9 7/8
1/4	.60	1.10	6 1/8	25/32	2.10	3.75	9 7/8
17/64	.65	1.20	6 1/4	51/64	2.20	4.00	10
9/32	.65	1.20	6 1/4	13/16	2.20	4.00	10
19/64	.70	1.30	6 3/8	53/64	2.40	4.40	10 1/4
5/16	.70	1.30	6 3/8	27/32	2.40	4.40	10 1/4
21/64	.75	1.40	6 1/2	55/64	2.60	4.75	10 1/2
11/32	.75	1.40	6 1/2	7/8	2.60	4.75	10 1/2
23/64	.80	1.50	6 3/4	57/64	2.80	5.15	10 5/8
3/8	.80	1.50	6 3/4	29/32	2.80	5.15	10 5/8
25/64	.90	1.65	7	59/64	3.00	5.50	10 3/4
13/32	.90	1.65	7	15/16	3.00	5.50	10 3/4
27/64	1.00	1.75	7 1/4	61/64	3.25	5.90	10 7/8
7/16	1.00	1.75	7 1/4	31/32	3.25	5.90	10 7/8
29/64	1.10	1.90	7 1/2	63/64	3.50	6.25	11
15/32	1.10	1.90	7 1/2	1	3.50	6.25	11
31/64	1.20	2.00	7 3/4	1 1/64	3.75	6.75	11 1/8
1/2	1.20	2.00	7 3/4	1 1/32	3.75	6.75	11 1/8
33/64	1.30	2.15	8	1 3/64	4.00	7.25	11 1/4
17/32	1.30	2.15	8	1 1/16	4.00	7.25	11 1/4
35/64	1.40	2.25	8 1/4	1 5/64	4.25	7.75	11 1/2
9/16	1.40	2.25	8 1/4	1 3/32	4.25	7.75	11 1/2
37/64	1.50	2.40	8 1/2	1 7/64	4.50	8.25	11 3/4

Continued on next page

"THE USE OF HIGH SPEED DRILLS"—PAGE 94-96

Straight Shank Drills, Long Set

(Continued)

Carbon Steel No. 110

Code Word—LABORLESS

High Speed Steel No. 415

Code Word—LIBERTY

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1 1/8	$4.50	$8.25	11 3/4	1 21/32	$11.00	$22.00	15 5/8
1 9/64	4.75	8.90	11 7/8	1 43/64	11.50	23.00	15 3/4
1 5/32	4.75	8.90	11 7/8	1 11/16	11.50	23.00	15 3/4
1 11/64	5.00	9.50	12	1 45/64	12.00	24.00	15 7/8
1 3/16	5.00	9.50	12	1 23/32	12.00	24.00	15 7/8
1 13/64	5.25	10.15	12 1/8	1 47/64	12.50	25.00	16
1 7/32	5.25	10.15	12 1/8	1 3/4	12.50	25.00	16
1 15/64	5.50	10.75	12 1/2	1 49/64	13.25	26.25	16 1/8
1 1/4	5.50	10.75	12 1/2	1 25/32	13.25	26.25	16 1/8
1 17/64	5.75	11.50	14 1/8	1 51/64	14.00	27.50	16 1/4
1 9/32	5.75	11.50	14 1/8	1 13/16	14.00	27.50	16 1/4
1 19/64	6.00	12.25	14 1/4	1 53/64	14.75	28.75	16 3/8
1 5/16	6.00	12.25	14 1/4	1 27/32	14.75	28.75	16 3/8
1 21/64	6.25	13.00	14 3/8	1 55/64	15.50	30.00	16 1/2
1 11/32	6.25	13.00	14 3/8	1 7/8	15.50	30.00	16 1/2
1 23/64	6.50	13.75	14 1/2	1 57/64	16.25	31.25	16 1/2
1 3/8	6.50	13.75	14 1/2	1 29/32	16.25	31.25	16 1/2
1 25/64	7.00	14.65	14 5/8	1 59/64	17.00	32.50	16 1/2
1 13/32	7.00	14.65	14 5/8	1 15/16	17.00	32.50	16 1/2
1 27/64	7.50	15.50	14 3/4	1 61/64	17.75	33.75	16 1/2
1 7/16	7.50	15.50	14 3/4	1 31/32	17.75	33.75	16 1/2
1 29/64	8.00	16.40	14 7/8	1 63/64	18.50	35.00	16 1/2
1 15/32	8.00	16.40	14 7/8	2	18.50	35.00	16 1/2
1 31/64	8.50	17.25	15	2 1/64	19.25	36.25	16 1/2
1 1/2	8.50	17.25	15	2 1/32	19.25	36.25	16 1/2
1 33/64	9.00	18.15	15 1/8	2 3/64	20.00	37.50	17
1 17/32	9.00	18.15	15 1/8	2 1/16	20.00	37.50	17
1 35/64	9.50	19.00	15 1/4	2 5/64	20.75	38.75	17
1 9/16	9.50	19.00	15 1/4	2 3/32	20.75	38.75	17
1 37/64	10.00	20.00	15 3/8	2 7/64	21.50	40.00	17
1 19/32	10.00	20.00	15 3/8	2 1/8	21.50	40.00	17
1 39/64	10.50	21.00	15 1/2	2 9/64	22.25	41.25	17
1 5/8	10.50	21.00	15 1/2	2 5/32	22.25	41.25	17
1 41/64	11.00	22.00	15 5/8	2 11/64	23.00	42.50	17

Continued on next page

"IS FILING A TEST OF DRILL QUALITY?"—Page 96

Straight Shank Drills, Long Set

(Continued)

Carbon Steel No. 110

Code Word—LABORLESS

High Speed Steel No. 415

Code Word—LIBERTY

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
2 1/16	$23.00	$42.50	17	2 41/64	$38.00	$85.00	20½
2 13/64	23.75	43.75	17½	2 3/4	38.00	85.00	20½
2 7/32	23.75	43.75	17½	2 43/64	39.25	87.50	20½
2 15/64	24.50	45.00	17½	2 45/64	39.25	87.50	20½
2 1/4	24.50	45.00	17½	2 23/32	40.50	90.00	20½
2 17/64	25.25	47.50	17½	2 47/64	40.50	90.00	20½
2 9/32	25.25	47.50	17½	2 13/16	41.75	92.50	21
2 19/64	26.00	50.00	17½	2 53/64	41.75	92.50	21
2 5/16	26.00	50.00	17½	2 27/32	43.00	95.00	21
2 21/64	26.75	52.50	18	2 55/64	43.00	95.00	21
2 11/32	26.75	52.50	18	2 7/8	44.25	97.50	21
2 23/64	27.50	55.00	18	2 57/64	44.25	97.50	21
2 3/8	27.50	55.00	18	2 29/32	45.50	100.00	21
2 25/64	28.25	57.50	18½	2 59/64	45.50	100.00	21
2 13/32	28.25	57.50	18½	2 15/16	46.75	102.50	22
2 27/64	29.00	60.00	18½	2 61/64	46.75	102.50	22
2 7/16	29.00	60.00	18½	2 31/32	48.00	105.00	22
2 29/64	29.75	62.50	19	2 63/64	48.00	105.00	22
2 15/32	29.75	62.50	19	3	48.00	105.00	22
2 31/64	30.50	65.00	19	3 1/16	52.00	112.50	22
2 1/2	30.50	65.00	19	3 1/8	56.00	120.00	22
2 33/64	31.25	67.50	19¼	3 3/16	60.00	127.50	22
2 17/32	31.25	67.50	19¼	3 1/4	65.00	135.00	23
2 35/64	32.00	70.00	19¼	3 5/16	70.00	142.50	23
2 9/16	32.00	70.00	19¼	3 3/8	75.00	150.00	23
2 37/64	33.00	72.50	19½	3 7/16	80.00	157.50	23
2 19/32	33.00	72.50	19½	3 1/2	85.00	165.00	24
2 39/64	34.00	75.00	19½	3 9/16	91.00	172.50	24
2 5/8	34.00	75.00	19½	3 5/8	98.00	180.00	24
2 41/64	35.00	77.50	20	3 11/16	105.00	187.50	24
2 21/32	35.00	77.50	20	3 3/4	112.00	195.00	24
2 43/64	36.00	80.00	20	3 13/16	119.00	202.50	24
2 11/16	36.00	80.00	20	3 7/8	126.00	210.00	24
2 45/64	37.00	82.50	20½	3 15/16	133.00	217.50	24
2 23/32	37.00	82.50	20½	4	140.00	225.00	25

"CHIPPED CUTTING EDGES" ON PAGE 92

Straight Shank Drills, Short Set

Carbon Steel No. 108

Code Word—LABIUM

High Speed Steel No. 417

Code Word –LIBRA

Diameter Inches	Price per Dozen		Length Over All Inches
	Carbon Steel	High Speed	
1/32	$1.50	.....	1 1/2
3/64	1.55	.....	1 3/4
1/16	1.60	$5.70	2 1/2
5/64	1.65	5.70	2 5/8
3/32	1.70	5.70	2 3/4
7/64	1.75	5.90	2 7/8
1/8	1.80	5.90	3
9/64	1.85	6.10	3 1/8
5/32	1.90	6.10	3 1/4
11/64	2.00	6.30	3 3/8
3/16	2.25	6.30	3 1/2
13/64	2.50	7.00	3 5/8
7/32	2.75	7.00	3 3/4
15/64	3.00	7.35	3 7/8
1/4	3.25	7.35	4
17/64	3.50	9.10	4 1/8
9/32	3.80	9.10	4 1/4
19/64	4.00	10.50	4 3/8
5/16	4.35	10.50	4 1/2
21/64	4.70	12.00	4 5/8
11/32	5.05	12.00	4 3/4
23/64	5.50	13.50	4 7/8
3/8	6.00	13.50	5
25/64	6.50	15.00	5 1/8
13/32	7.00	15.00	5 1/4
27/64	7.75	17.00	5 3/8
7/16	8.50	17.00	5 1/2
29/64	9.25	18.75	5 5/8
15/32	10.00	18.75	5 3/4
31/64	11.00	20.00	5 7/8
1/2	12.00	20.00	6

Sizes 1/16 to 5/16 inch inclusive, packed one dozen to envelope; 21/64 to 1/2 inch inclusive, half dozen in envelope. Broken packages 20% extra.

For Straight Shank Drills for Wood, see page 65

"PROPER SPEED FOR SMALL HOLES"—PAGE 95

Straight Shank Drills, Wire Gauge

Carbon Steel No. 108A

Code Word—LABOR

High Speed Steel No. 418

Code Word—LIBRARIES

Wire Gauge No.	Price per Dozen		Decimal Diameter Inches	Length Over All Inches	Wire Gauge No.	Price per Dozen		Decimal Diameter Inches	Length Over All Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1	$2.75	$7.00	.2280	4	31	$1.75	$5.90	.1200	2¾
2	2.75	7.00	.2210	3 15/16	32	1.75	5.90	.1160	2 11/16
3	2.75	7.00	.2130	3 15/16	33	1.75	5.90	.1130	2 11/16
4	2.75	7.00	.2090	3⅞	34	1.75	5.90	.1110	2⅝
5	2.75	7.00	.2055	3 13/16	35	1.75	5.90	.1100	2 9/16
6	2.50	7.00	.2040	3 13/16	36	1.75	5.90	.1065	2 9/16
7	2.50	7.00	.2010	3¾	37	1.75	5.90	.1040	2½
8	2.50	7.00	.1990	3 11/16	38	1.75	5.90	.1015	2 7/16
9	2.50	7.00	.1960	3 11/16	39	1.75	5.90	.0995	2 7/16
10	2.50	7.00	.1935	3⅝	40	1.75	5.90	.0980	2⅜
11	2.25	6.30	.1910	3 9/16	41	1.70	5.70	.0960	2 5/16
12	2.25	6.30	.1890	3 9/16	42	1.70	5.70	.0935	2 5/16
13	2.25	6.30	.1850	3½	43	1.70	5.70	.0890	2¼
14	2.25	6.30	.1820	3 7/16	44	1.70	5.70	.0860	2 3/16
15	2.25	6.30	.1800	3 7/16	45	1.70	5.70	.0820	2 3/16
16	2.00	6.30	.1770	3⅜	46	1.65	5.70	.0810	2⅛
17	2.00	6.30	.1730	3 5/16	47	1.65	5.70	.0785	2 1/16
18	2.00	6.30	.1695	3 5/16	48	1.65	5.70	.0760	2 1/16
19	2.00	6.30	.1660	3¼	49	1.65	5.70	.0730	2
20	2.00	6.30	.1610	3 3/16	50	1.65	5.70	.0700	1 15/16
21	1.90	6.10	.1590	3 3/16	51	1.60	5.70	.0670	1 15/16
22	1.90	6.10	.1570	3⅛	52	1.60	5.70	.0635	1⅞
23	1.90	6.10	.1540	3 1/16	53	1.60	5.70	.0595	1 13/16
24	1.90	6.10	.1520	3 1/16	54	1.60	5.70	.0550	1 13/16
25	1.90	6.10	.1495	3	55	1.60	5.70	.0520	1¾
26	1.80	6.10	.1470	2 15/16	56	1.55	5.70	.0465	1 11/16
27	1.80	6.10	.1440	2 15/16	57	1.55	5.70	.0430	1 11/16
28	1.80	6.10	.1405	2⅞	58	1.55	5.70	.0420	1⅝
29	1.80	6.10	.1360	2 13/16	59	1.55	5.70	.0410	1 9/16
30	1.80	6.10	.1285	2 13/16	60	1.55	5.70	.0400	1 9/16

Continued on next page

Nos. 1 to 80 inclusive, packed one dozen to envelope; broken packages 20% extra.

"INDICATION OF TOO GREAT SPEED"—PAGE 94

Straight Shank Drills, Wire Gauge

(Continued)

Carbon Steel No. 108A

Code Word—LABOR

Wire Gauge No.	Price per Dozen	Decimal Diameter Inches	Length Over All Inches	Wire Gauge No.	Price per Dozen	Decimal Diameter Inches	Length Over All Inches
61	$1.50	.0390	1½	71	$1.50	.0260	1 5/16
62	1.50	.0380	1½	72	1.50	.0250	1¼
63	1.50	.0370	1½	73	1.50	.0240	1 3/16
64	1.50	.0360	1½	74	1.50	.0225	1⅛
65	1.50	.0350	1½	75	1.50	.0210	1 1/16
66	1.50	.0330	1½	76	1.50	.0200	1
67	1.50	.0320	1 7/16	77	1.50	.0180	15/16
68	1.50	.0310	1 7/16	78	1.50	.0160	⅞
69	1.50	.02925	1⅜	79	1.50	.0145	13/16
70	1.50	.0280	1 5/16	80	1.50	.0135	¾

Nos. 1 to 80 inclusive, packed one dozen to envelope; broken packages 20% extra.

Straight Shank Drills, Letter Size—Carbon Steel No. 109

Code Word—LABORING

High Speed Steel No. 419

Code Word—LIBRETTO

Diameter	Price per Dozen		Decimal Diameter Inches	Length Over All Inches	Diameter	Price per Dozen		Decimal Diameter Inches	Length Over All Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
A	$3.00	$7.35	.234	3 13/16	N	$4.25	$10.50	.302	4¼
B	3.05	7.35	.238	3 13/16	O	4.40	10.50	.316	4¼
C	3.10	7.35	.242	3 13/16	P	4.60	12.00	.323	4 5/8
D	3.15	7.35	.246	3 13/16	Q	4.75	12.00	.332	4¾
E	3.25	7.35	.250	3 13/16	R	5.00	12.00	.339	4¾
F	3.35	9.10	.257	4¼	S	5.15	13.50	.348	4⅞
G	3.45	9.10	.261	4¼	T	5.30	13.50	.358	4⅞
H	3.55	9.10	.266	4¼	U	5.50	13.50	.368	5
I	3.65	9.10	.272	4¼	V	6.00	13.50	.377	5
J	3.70	9.10	.277	4¼	W	6.50	15.00	.386	5⅛
K	3.80	9.10	.281	4¼	X	6.75	15.00	.397	5¼
L	3.90	10.50	.290	4¼	Y	7.00	15.00	.404	5¼
M	4.00	10.50	.295	4¼	Z	7.25	15.00	.413	5⅜

Sizes A to N inclusive packed one dozen to envelope; sizes 0 to Z inclusive one-half dozen to envelope. Broken packages 20% extra.

For Drills in Sets see page 66.

"SPEED AND FEED TABLE" ON PAGE 101

No. 125—Center Drills

Code Word—LAGERS

Diameter Inches	Price per Dozen	Length Over All Inches	Diameter Inches	Price per Dozen	Length Over All Inches
1/16	$1.60	1	11/64	$2.00	1 1/2
5/64	1.65	1	3/16	2.25	1 1/2
3/32	1.70	1 1/4	13/64	2.50	1 1/2
7/64	1.75	1 1/4	7/32	2.75	1 1/2
1/8	1.80	1 1/4	15/64	3.00	1 1/2
9/64	1.85	1 1/4	1/4	3.25	1 1/2
5/32	1.90	1 1/2	17/64	3.50	1 1/2

No. 125B—Center Drills, Wire Gauge

Code Word—LAGGMORE

Wire Gauge Size No.	Price per Dozen	Decimal Diameter Inches	Length Over All Inches
30	$1.80	.1285	1 1/4
40	1.75	.0980	1 1/4
45	1.70	.0820	1 1/4
50	1.65	.0700	1 1/4
55	1.60	.0520	1 1/4

Tell-Tale Drills

Carbon Steel No. 112

Code Word—LACES

High Speed Steel No. 452

Code Word - LILY

For Drilling Tell-Tale Holes in Stay-Bolts

Diameter Inches	Price per Dozen		Length of Flute Inches	Length Over All Inches
	Carbon Steel	High Speed		
1/4	$2.25	$6.30	1 3/4	3 1/2

Bonding Drills

Carbon Steel No. 95

Code Word—LABALM

High Speed Steel No. 444

Code Word - LIGHTNING

These drills are specially designed and tempered for drilling holes for bonding wires in track circuit signal work. For the new high duty rails the high speed drill is recommended.

Diameter Inches	Price per Dozen		Length of Flute Inches	Length Over All Inches
	Carbon Steel	High Speed		
1/4	$3.80	$9.10	1 3/4	3

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Two-Grooved Shank Drills, Long Set

Carbon Steel No. 164

Code Word—LANDSIGHT

High Speed Steel No. 412

Code Word—LIBERAL

These Drills have the same dimensions and list prices as Long Set Straight Shank Drills on pages 37, 38, and 39.

For Two-Jawed Chucks see page 31.

Two-Grooved Shank Drills, Short Set

Carbon Steel No. 162

Code Word—LANDSEER

High Speed Steel No. 423

Code Word—LICHEN

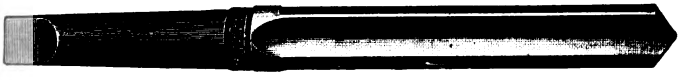
These Drills have the same dimensions and list prices as Short Set Straight Shank Drills on page 40.

For Two-Jawed Chucks see page 31.

Carbon Steel Straight Fluted Drills

No. 147—Taper Shank Straight Fluted Drills

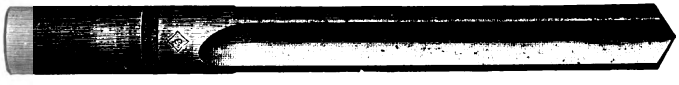
Code Word—LANDLORD



No. 160—Straight Shank Straight Fluted Drills

(Long Set)

Code Word—LANDSCENE



These Drills are especially adapted for work in brass, copper or other soft metals, as they will not run ahead or "grab." They have the same dimensions and list prices as Taper Shank Drills No. 106 on pages 33, 34 and 35 and Straight Shank Drills No. 110 on pages 37, 38 and 39. They will be furnished of high speed steel to order.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 145—Straight Shank Straight Fluted Drills

(Short Set)

Code Word—LANDLESS

No. 166—Straight Shank Straight Fluted Drills

(Wire Gauge)

Code Word—LANDSKIT

These Drills are especially adapted for work in brass, copper or other soft metals, as they will not run ahead or "grab." They have the same dimensions and list prices as Short Set and Wire Gauge Straight Shank Drills on pages 40 and 41. They will be furnished of high speed steel to order.

Taper Shank Oil Hole Drills

Carbon Steel No. 91A

Code Word—LABAGGED

High Speed Steel No. 426A

Code Word—LICKED

Straight Shank Oil Hole Drills

Carbon Steel No. 99A

Code Word—LABEGAND

High Speed Steel No. 429A

Code Word—LICKSPIT

These Drills are furnished with oil holes through the solid metal for lubricant or air. Prices on application.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Three-Fluted Taper Shank Drills

Carbon Steel No. 12

Code Word—LAB

High Speed Steel No. 407

Code Word—LIBEL

Are especially adapted for enlarging cored, punched or drilled holes. They will not drill the initial hole

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1/4	$1.00	$2.00	6 1/8	
9/32	1.05	2.15	6 1/4	
5/16	1.10	2.25	6 3/8	
11/32	1.15	2.40	6 1/2	
3/8	1.20	2.50	6 3/4	
13/32	1.25	2.65	7	No. 1
7/16	1.30	2.75	7 1/4	
15/32	1.40	2.90	7 1/2	
1/2	1.50	3.00	7 3/4	
17/32	1.60	3.15	8	
9/16	1.70	3.25	8 1/4	
19/32	1.80	3.50	8 1/2	
5/8	1.90	3.75	8 3/4	
21/32	2.00	4.00	9	
11/16	2.10	4.25	9 1/4	
23/32	2.25	4.65	9 1/2	
3/4	2.40	5.00	9 3/4	No. 2
25/32	2.55	5.40	9 7/8	
13/16	2.70	5.75	10	
27/32	2.85	6.15	10 1/4	
7/8	3.00	6.50	10 1/2	
29/32	3.15	7.00	10 5/8	
15/16	3.30	7.50	10 3/4	
31/32	3.45	8.00	10 7/8	
1	3.60	8.50	11	
1 1/32	3.75	9.00	11 1/8	
1 1/16	4.00	9.50	11 1/4	
1 3/32	4.25	10.25	11 1/2	No. 3
1 1/8	4.50	11.00	11 3/4	
1 5/32	4.75	11.75	11 7/8	
1 3/16	5.00	12.50	12	
1 7/32	5.25	13.25	12 1/8	
1 1/4	5.50	14.00	12 1/2	
1 9/32	5.75	14.75	14 1/8	
1 5/16	6.00	15.50	14 1/4	No. 4
1 11/32	6.25	16.25	14 3/8	

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1 3/8	$6.50	$17.00	14 1/2	
1 13/32	7.00	17.75	14 5/8	
1 7/16	7.50	18.50	14 3/4	
1 15/32	8.00	19.25	14 7/8	
1 1/2	8.50	20.00	15	
1 17/32	9.00	20.75	15 1/8	
1 9/16	9.50	21.50	15 1/4	
1 19/32	10.00	22.25	15 3/8	
1 5/8	10.50	23.00	15 1/2	
1 21/32	11.00	23.75	15 5/8	
1 11/16	11.50	24.50	15 3/4	No. 4
1 23/32	12.00	25.50	15 7/8	
1 3/4	12.50	26.50	16	
1 25/32	13.25	27.50	16 1/8	
1 13/16	14.00	28.50	16 1/4	
1 27/32	14.75	29.50	16 3/8	
1 7/8	15.50	30.50	16 1/2	
1 29/32	16.25	31.50	16 1/2	
1 15/16	17.00	32.50	16 1/2	
1 31/32	17.75	33.50	16 1/2	
2	18.50	34.50	16 1/2	
2 1/32	19.25	36.00	16 1/2	
2 1/16	20.00	37.50	17	
2 1/8	21.50	40.50	17	
2 3/16	23.00	43.75	17	
2 1/4	24.50	47.50	17 1/2	
2 5/16	26.00	52.50	17 1/2	
2 3/8	27.50	60.00	18	
2 7/16	29.00	65.00	18 1/2	
2 1/2	30.50	70.00	19	No. 5
2 9/16	32.00	76.25	19 1/4	
2 5/8	34.00	82.50	19 1/2	
2 11/16	36.00	88.75	20	
2 3/4	38.00	95.00	20 1/2	
2 13/16	40.50	102.50	20 1/2	
2 7/8	43.00	110.00	21	
2 15/16	45.50	117.50	21	
3	48.00	125.00	22	

ELIMINATE BROKEN TANGS—SEE PAGE 23

Three-Fluted Straight Shank Drills

Carbon Steel No. 24

Code Word—LABACO

High Speed Steel No. 409

Code Word—LIBELLING

Are especially adapted for enlarging cored, punched or drilled holes. They will not drill the initial hole.

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches
1/4	$1.00	$2.00	6 1/8	1 13/32	$7.00	$17.75	14 5/8
9/32	1.05	2.15	6 1/4	1 7/16	7.50	18.50	14 3/4
5/16	1.10	2.25	6 3/8	1 15/32	8.00	19.25	14 7/8
11/32	1.15	2.40	6 1/2	1 1/2	8.50	20.00	15
3/8	1.20	2.50	6 3/4	1 17/32	9.00	20.75	15 1/8
13/32	1.25	2.65	7	1 9/16	9.50	21.50	15 1/4
7/16	1.30	2.75	7 1/4	1 19/32	10.00	22.25	15 3/8
15/32	1.40	2.90	7 1/2	1 5/8	10.50	23.00	15 1/2
1/2	1.50	3.00	7 3/4	1 21/32	11.00	23.75	15 5/8
17/32	1.60	3.15	8	1 11/16	11.50	24.50	15 3/4
9/16	1.70	3.25	8 1/4	1 23/32	12.00	25.50	15 7/8
19/32	1.80	3.50	8 1/2	1 3/4	12.50	26.50	16
5/8	1.90	3.75	8 3/4	1 25/32	13.25	27.50	16 1/8
21/32	2.00	4.00	9	1 13/16	14.00	28.50	16 1/4
11/16	2.10	4.25	9 1/4	1 27/32	14.75	29.50	16 3/8
23/32	2.25	4.65	9 1/2	1 7/8	15.50	30.50	16 1/2
3/4	2.40	5.00	9 3/4	1 29/32	16.25	31.50	16 1/2
25/32	2.55	5.40	9 7/8	1 15/16	17.00	32.50	16 1/2
13/16	2.70	5.75	10	1 31/32	17.75	33.50	16 1/2
27/32	2.85	6.15	10 1/4	2	18.50	34.50	16 1/2
7/8	3.00	6.50	10 1/2	2 1/32	19.25	36.00	16 1/2
29/32	3.15	7.00	10 5/8	2 1/16	20.00	37.50	17
15/16	3.30	7.50	10 3/4	2 1/8	21.50	40.50	17
31/32	3.45	8.00	10 7/8	2 3/16	23.00	43.75	17
1	3.60	8.50	11	2 1/4	24.50	47.50	17 1/2
1 1/32	3.75	9.00	11 1/8	2 5/16	26.00	52.50	17 1/2
1 1/16	4.00	9.50	11 1/4	2 3/8	27.50	60.00	18
1 3/32	4.25	10.25	11 1/2	2 7/16	29.00	65.00	18 1/2
1 1/8	4.50	11.00	11 3/4	2 1/2	30.50	70.00	19
1 5/32	4.75	11.75	11 7/8	2 9/16	32.00	76.25	19 1/4
1 3/16	5.00	12.50	12	2 5/8	34.00	82.50	19 1/2
1 7/32	5.25	13.25	12 1/8	2 11/16	36.00	88.75	20
1 1/4	5.50	14.00	12 1/2	2 3/4	38.00	95.00	20 1/4
1 9/32	5.75	14.75	14 1/8	2 13/16	40.50	102.50	20 1/2
1 5/16	6.00	15.50	14 1/4	2 7/8	43.00	110.00	21
1 11/32	6.25	16.25	14 3/8	2 15/16	45.50	117.50	21
1 3/8	6.50	17.00	14 1/2	3	48.00	125.00	22

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Four-Fluted Taper Shank Drills

Carbon Steel No. 21

Code Word—LABACING

High Speed Steel No. 438

Code Word—LIFELIKE

Are especially adapted for enlarging cored, punched or drilled holes. They will not drill the initial hole

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1/4	$1.00	$2.00	6 1/8	
9/32	1.05	2.15	6 1/4	
5/16	1.10	2.25	6 3/8	
11/32	1.15	2.40	6 1/2	
3/8	1.20	2.50	6 3/4	
13/32	1.25	2.65	7	No. 1
7/16	1.30	2.75	7 1/4	
15/32	1.40	2.90	7 1/2	
1/2	1.50	3.00	7 3/4	
17/32	1.60	3.15	8	
9/16	1.70	3.25	8 1/4	
19/32	1.80	3.50	8 1/2	
5/8	1.90	3.75	8 3/4	
21/32	2.00	4.00	9	
11/16	2.10	4.25	9 1/4	
23/32	2.25	4.65	9 1/2	
3/4	2.40	5.00	9 3/4	No. 2
25/32	2.55	5.40	9 7/8	
13/16	2.70	5.75	10	
27/32	2.85	6.15	10 1/4	
7/8	3.00	6.50	10 1/2	
29/32	3.15	7.00	10 5/8	
15/16	3.30	7.50	10 3/4	
31/32	3.45	8.00	10 7/8	
1	3.60	8.50	11	
1 1/32	3.75	9.00	11 1/8	
1 1/16	4.00	9.50	11 1/4	
1 3/32	4.25	10.25	11 1/2	No. 3
1 1/8	4.50	11.00	11 3/4	
1 5/32	4.75	11.75	11 7/8	
1 3/16	5.00	12.50	12	
1 7/32	5.25	13.25	12 1/8	
1 1/4	5.50	14.00	12 1/2	
1 9/32	5.75	14.75	14 1/8	
1 5/16	6.00	15.50	14 1/4	No. 4
1 11/32	6.25	16.25	14 3/8	
1 3/8	$6.50	$17.00	14 1/2	
1 13/32	7.00	17.75	14 5/8	
1 7/16	7.50	18.50	14 3/4	
1 15/32	8.00	19.25	14 7/8	
1 1/2	8.50	20.00	15	
1 17/32	9.00	20.75	15 1/8	
1 9/16	9.50	21.50	15 1/4	
1 19/32	10.00	22.25	15 3/8	
1 5/8	10.50	23.00	15 1/2	
1 21/32	11.00	23.75	15 5/8	
1 11/16	11.50	24.50	15 3/4	No. 4
1 23/32	12.00	25.50	15 7/8	
1 3/4	12.50	26.50	16	
1 25/32	13.25	27.50	16 1/8	
1 13/16	14.00	28.50	16 1/4	
1 27/32	14.75	29.50	16 3/8	
1 7/8	15.50	30.50	16 1/2	
1 29/32	16.25	31.50	16 1/2	
1 15/16	17.00	32.50	16 1/2	
1 31/32	17.75	33.50	16 1/2	
2	18.50	34.50	16 1/2	
2 1/32	19.25	36.00	16 1/2	
2 1/16	20.00	37.50	17	
2 1/8	21.50	40.50	17	
2 3/16	23.00	43.75	17	
2 1/4	24.50	47.50	17 1/2	
2 5/16	26.00	52.50	17 1/2	
2 3/8	27.50	60.00	18	
2 7/16	29.00	65.00	18 1/2	
2 1/2	30.50	70.00	19	No. 5
2 9/16	32.00	76.25	19 1/4	
2 5/8	34.00	82.50	19 1/2	
2 11/16	36.00	88.75	20	
2 3/4	38.00	95.00	20 1/2	
2 13/16	40.50	102.50	20 1/2	
2 7/8	43.00	110.00	21	
2 15/16	45.50	117.50	21	
3	48.00	125.00	22	

DOUBLE THE STRENGTH AT A SAVING—PAGE 24

Four-Fluted Straight Shank Drills

Carbon Steel No. 25
Code Word—LABACITE

High Speed Steel No. 439
Code Word—LIFEPLANT

Are especially adapted for enlarging cored, punched or drilled holes. They will not drill the initial hole.

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches
1/4	$1.00	$2.00	6 1/8	1 13/32	$7.00	$17.75	14 5/8
9/32	1.05	2.15	6 1/4	1 7/16	7.50	18.50	14 3/4
5/16	1.10	2.25	6 3/8	1 15/32	8.00	19.25	14 7/8
11/32	1.15	2.40	6 1/2	1 1/2	8.50	20.00	15
3/8	1.20	2.50	6 3/4	1 17/32	9.00	20.75	15 1/8
13/32	1.25	2.65	7	1 9/16	9.50	21.50	15 1/4
7/16	1.30	2.75	7 1/4	1 19/32	10.00	22.25	15 3/8
15/32	1.40	2.90	7 1/2	1 5/8	10.50	23.00	15 1/2
1/2	1.50	3.00	7 3/4	1 21/32	11.00	23.75	15 5/8
17/32	1.60	3.15	8	1 11/16	11.50	24.50	15 3/4
9/16	1.70	3.25	8 1/4	1 23/32	12.00	25.50	15 7/8
19/32	1.80	3.50	8 1/2	1 3/4	12.50	26.50	16
5/8	1.90	3.75	8 3/4	1 25/32	13.25	27.50	16 1/8
21/32	2.00	4.00	9	1 13/16	14.00	28.50	16 1/4
11/16	2.10	4.25	9 1/4	1 27/32	14.75	29.50	16 3/8
23/32	2.25	4.65	9 1/2	1 7/8	15.50	30.50	16 1/2
3/4	2.40	5.00	9 3/4	1 29/32	16.25	31.50	16 1/2
25/32	2.55	5.40	9 7/8	1 15/16	17.00	32.50	16 1/2
13/16	2.70	5.75	10	1 31/32	17.75	33.50	16 1/2
27/32	2.85	6.15	10 1/4	2	18.50	34.50	16 1/2
7/8	3.00	6.50	10 1/2	2 1/32	19.25	36.00	16 1/2
29/32	3.15	7.00	10 3/8	2 1/16	20.00	37.50	17
15/16	3.30	7.50	10 3/4	2 1/8	21.50	40.50	17
31/32	3.45	8.00	10 7/8	2 3/16	23.00	43.75	17
1	3.60	8.50	11	2 1/4	24.50	47.50	17 1/2
1 1/32	3.75	9.00	11 1/8	2 5/16	26.00	52.50	17 1/2
1 1/16	4.00	9.50	11 1/4	2 3/8	27.50	60.00	18
1 3/32	4.25	10.25	11 1/2	2 7/16	29.00	65.00	18 1/2
1 1/8	4.50	11.00	11 3/4	2 1/2	30.50	70.00	19
1 5/32	4.75	11.75	11 7/8	2 9/16	32.00	76.25	19 1/4
1 3/16	5.00	12.50	12	2 5/8	34.00	82.50	19 1/2
1 7/32	5.25	13.25	12 1/8	2 11/16	36.00	88.75	20
1 1/4	5.50	14.00	12 1/2	2 3/4	38.00	95.00	20 1/2
1 9/32	5.75	14.75	14 1/8	2 13/16	40.50	102.50	20 1/2
1 5/16	6.00	15.50	14 1/4	2 7/8	43.00	110.00	21
1 11/32	6.25	16.25	14 3/8	2 15/16	45.50	117.50	21
1 3/8	6.50	17.00	14 1/2	3	48.00	125.00	22

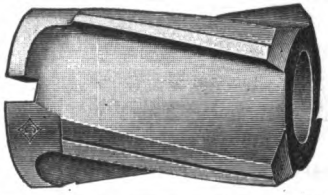
Shell Drills

Carbon Steel No. 86

Code Word—LABACK

High Speed Steel No. 446

Code Word—LIKE



Diameter Inches	Price Each: Carbon Steel	Price Each: High Speed	Length Over All Inches	Size Hole Inches	Fitting Arbor
1 11/16	$5.10	$ 9.75	3½	1	No. 8
1 23/32	5.40	10.50	3½	1	
1¾	5.40	10.50	3½	1	
1 25/32	5.70	11.25	3½	1	
1 13/16	5.70	11.25	3½	1	
1 27/32	6.00	12.00	3½	1	
1⅞	6.00	12.00	3½	1	
1 29/32	6.30	12.75	3½	1	
1 15/16	6.30	12.75	3½	1	
1 31/32	6.60	13.50	3½	1	
2	6.60	13.50	3½	1	
2 1/16	6.95	14.25	3¾	1¼	No. 9
2⅛	7.30	15.00	3¾	1¼	
2 3/16	7.65	15.75	3¾	1¼	
2¼	8.00	16.50	3¾	1¼	
2 5/16	8.35	17.25	3¾	1¼	
2⅜	8.70	18.00	3¾	1¼	
2 7/16	9.05	18.75	3¾	1¼	
2½	9.40	19.50	3¾	1¼	
2 9/16	9.80	20.50	4	1½	No. 10
2⅝	10.20	21.75	4	1½	
2 11/16	10.60	23.00	4	1½	
2¾	11.00	24.25	4	1½	
2 13/16	11.40	25.50	4	1½	
2⅞	11.80	27.00	4	1½	
2 15/16	12.20	28.50	4	1½	
3	12.60	30.00	4	1½	

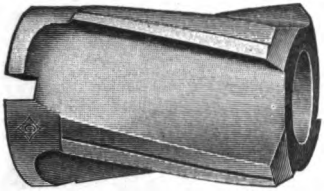
Continued on next page

Shell Drills have taper holes, the diameter given being at the large end.

All sizes and dimensions not listed are special and subject to special prices.

"IS FILING A TEST OF DRILL QUALITY?"—PAGE 96

Shell Drills
(Continued)



Carbon Steel No. 86
Code Word—LABACK

High Speed Steel No. 446
Code Word LIKE

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Size Hole Inches	Fitting Arbor
3 1/16	$13.10	$31 50	4½	1¾	
3⅛	13.60	33 25	4½	1¾	
3 3/16	14.10	35 25	4½	1¾	
3¼	14.60	37 50	4½	1¾	No. 11
3 5/16	15.10	40 00	4½	1¾	
3⅜	15.60	42 50	4½	1¾	
3 7/16	16.10	45 25	4½	1¾	
3½	16.60	48 00	4½	1¾	
3 9/16	17.20	50 75	5	2	
3⅝	17.80	53 50	5	2	
3 11/16	18.40	56 50	5	2	
3¾	19.00	59 50	5	2	No. 12
3 13/16	19.60	62 75	5	2	
3⅞	20.20	66 00	5	2	
3 15/16	20.80	69 25	5	2	
4	21.40	72 50	5	2	
4⅛	22.90	79 00	5½	2¼	
4¼	24.40	85 50	5½	2¼	No. 13
4⅜	25.90	92 00	5½	2¼	
4½	27.40	98 50	5½	2¼	
4⅝	29.30	105 00	6	2½	
4¾	31.20	111 50	6	2½	No. 14
4⅞	33.10	118 00	6	2½	
5	35.00	125 00	6	2½	

Shell Drills 1 11/16 to 3½ inches, inclusive, have 4 flutes.
Shell Drills 3 9/16 to 5 inches, inclusive, have 6 flutes.
Shell Drills have taper holes, the diameter given being at the large end.

These Drills take the same Arbors as regular Shell Reamers.

For Arbors see pages 111, 112 and 180.

All sizes and dimensions not listed are special and subject to special prices.

A WORLD'S RECORD DRILL ON PAGE 82

Taper Shank Oil Tube Drills

Carbon Steel No. 91

Code Word—LABAG

High Speed Steel No. 426

Code Word—LICK

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1/2	$2.25	$5.00	7 3/4	No. 1
17/32	2.40	5.40	8	
9/16	2.60	5.75	8 1/4	
19/32	2.80	6.15	8 1/2	No. 2
5/8	3.00	6.50	8 3/4	
21/32	3.20	6.90	9	
11/16	3.40	7.25	9 1/4	
23/32	3.60	7.65	9 1/2	
3/4	3.80	8.00	9 3/4	
25/32	4.00	8.40	9 7/8	
13/16	4.20	8.75	10	
27/32	4.40	9.15	10 1/4	
7/8	4.60	9.50	10 1/2	
29/32	4.80	10.00	10 5/8	
15/16	5.00	10.50	10 3/4	No. 3
31/32	5.20	11.00	10 7/8	
1	5.40	11.50	11	
1 1/32	5.60	12.00	11 1/8	
1 1/16	5.80	12.50	11 1/4	
1 3/32	6.00	13.25	11 1/2	
1 1/8	6.20	14.00	11 3/4	
1 5/32	6.40	14.75	11 7/8	
1 3/16	6.60	15.50	12	
1 7/32	6.80	16.50	12 1/8	
1 1/4	7.00	17.50	12 1/2	
1 9/32	$7.30	$18.65	14 1/8	No. 4
1 5/16	7.60	19.75	14 1/4	
1 11/32	8.00	20.90	14 3/8	
1 3/8	8.50	22.00	14 1/2	
1 13/32	9.10	23.15	14 5/8	
1 7/16	9.75	24.25	14 3/4	
1 15/32	10.35	25.50	14 7/8	
1 1/2	10.95	26.75	15	
1 17/32	11.50	28.00	15 1/8	
1 9/16	12.00	29.25	15 1/4	
1 19/32	12.50	30.50	15 3/8	
1 5/8	13.00	31.75	15 1/2	
1 21/32	13.50	33.00	15 5/8	
1 11/16	14.00	34.25	15 3/4	
1 23/32	14.50	35.75	15 7/8	
1 3/4	15.00	37.25	16	
1 25/32	15.50	38.75	16 1/8	
1 13/16	16.00	40.25	16 1/4	
1 27/32	16.50	41.90	16 3/8	
1 7/8	17.00	43.50	16 1/2	
1 29/32	17.50	45.15	16 1/2	
1 15/16	18.00	46.75	16 1/2	
1 31/32	18.50	48.40	16 1/2	
2	19.00	50.00	16 1/2	

Sixty-fourth sizes take list price of next larger size.

The holes in the shanks of these drills register with a channel in the body of the Oil Feeding Socket, so that when the drill is inserted in the Socket there is a continuous feed of oil to the cutting lips of the drill.

For Oil Feeding Sockets, see page 30.

"CORRECT CUTTING COMPOUNDS"—PAGE 96

Straight Shank Oil Tube Drills

Carbon Steel No. 99

Code Word—LABATING— 9 inch Lengths
Code Word—LABEFY— 12 inch Lengths
Code Word—LABEFYING—14 inch Lengths
Code Word—LABEGA— 16 inch Lengths

Diameter Inches	Price Each 9 Inches Long	Price Each 12 Inches Long
5/8	$2.70	$3.30
21/32	2.80	3.40
11/16	2.90	3.50
23/32	3.00	3.60
3/4	3.10	3.70
25/32	3.20	3.80
13/16	3.30	3.90
27/32	3.40	4.00
7/8	3.50	4.10
29/32	3.60	4.25
15/16	3.75	4.45
31/32	3.90	4.65
1	4.10	4.85
1 1/32	4.30	5.05
1 1/16	4.45	5.25
1 3/32	4.60	5.50
1 1/8	4.75	5.75
1 5/32	4.95	6.00
1 3/16	5.15	6.25
1 7/32	5.35	6.50
1 1/4	5.65	6.75
1 9/32	5.95	7.00
1 5/16	6.25	7.25
1 11/32	6.55	7.50
1 3/8	6.85	8.00
1 13/32	7.15	8.50
1 7/16	7.50	9.00
1 15/32	7.85	9.50
1 1/2	8.25	10.00

Diameter Inches	Price Each 14 Inches Long
1 17/32	$11.50
1 9/16	11.90
1 19/32	12.25
1 5/8	12.65
1 21/32	13.00
1 11/16	13.35
1 23/32	13.70
1 3/4	14.00

Diameter Inches	Price Each 16 Inches Long
1 25/32	$15.50
1 13/16	16.00
1 27/32	16.50
1 7/8	17.00
1 29/32	17.50
1 15/16	18.00
1 31/32	18.50
2	19.00

Drills 9 inches long over all have 7 inches of flute.

Drills 12 inches long over all have 10 inches of flute.

Drills 14 inches long over all have 12 inches of flute.

Drills 16 inches long over all have 14 inches of flute.

We can make Drills for special purposes. Prices on application.

"SPEED AND FEED TABLE" ON PAGE 101

Straight Shank Oil Tube Drills

High Speed Steel No. 429

Code Word—LICKING

SIZE Inches	LENGTHS OVER ALL				
	9 Inches	12 Inches	14 Inches	16 Inches	18 Inches
1/2	$6.00	$7.50	$9.00	.....	.....
9/16	6.25	7.75	9.25	.....	.....
5/8	6.50	8.00	9.50	.....	.....
21/32	6.65	8.15	9.75	.....	.....
11/16	6.75	8.25	10.00	.....	.....
23/32	6.90	8.50	10.25	.....	.....
3/4	7.00	8.75	10.50	$12.25	$14.00
25/32	7.25	9.00	10.75	12.50	14.25
13/16	7.50	9.25	11.00	12.75	14.50
27/32	7.90	9.65	11.40	13.15	14.90
7/8	8.25	10.00	11.75	13.50	15.25
29/32	8.65	10.40	12.15	13.90	15.65
15/16	9.00	10.75	12.50	14.25	16.00
31/32	9.40	11.15	12.90	14.75	16.65
1	9.75	11.50	13.25	15.25	17.25
1 1/32	10.15	12.00	13.90	15.90	17.90
1 1/16	10.50	12.50	14.50	16.50	18.50
1 3/32	10.90	13.00	15.15	17.25	19.40
1 1/8	11.25	13.50	15.75	18.00	20.25
1 5/32	11.65	14.00	16.40	18.75	21.15
1 3/16	12.00	14.50	17.00	19.50	22.00
1 7/32	12.40	15.00	17.65	20.25	22.90
1 1/4	12.75	15.50	18.25	21.00	23.75
1 9/32	13.15	16.00	18.90	21.75	24.65
1 5/16	13.50	16.50	19.50	22.50	25.50
1 11/32	13.90	17.00	20.15	23.25	26.40
1 3/8	14.25	17.50	20.75	24.00	27.25
1 13/32	14.75	18.15	21.50	24.90	28.25
1 7/16	15.25	18.75	22.25	25.75	29.25
1 15/32	15.90	19.50	23.15	26.65	30.25
1 1/2	16.50	20.25	24.00	27.50	31.25
1 9/16	17.75	21.75	25.75	29.75	33.75
1 5/8	19.00	23.50	28.00	32.50	37.00
1 11/16	20.25	25.25	30.25	35.25	40.25
1 3/4	21.50	27.00	32.50	38.00	43.50
1 13/16	23.00	29.00	35.00	41.00	47.00
1 7/8	24.50	31.00	37.50	44.00	50.50
1 15/16	26.00	33.00	40.00	47.00	54.00
2	27.50	35.00	42.50	50.00	57.50

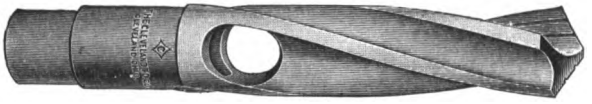
Drills differing from above dimensions are special and only made to order. Prices on application.

"INDICATION OF TOO GREAT SPEED"—PAGE 94

No. 87—Hollow Drills

For Drilling Deep Holes

Code Word—LABADZE



Diameter Inches	Price Each	Total Length Inches	Diameter of Hole Inches	Diameter Inches	Price Each	Total Length Inches	Diameter of Hole Inches
5/8	$5.50	6	11/32	1 7/8	$14.00	9	1 1/8
11/16	5.75	6	3/8	1 15/16	15.00	9	1 1/8
3/4	6.00	6	13/32	2	16.00	9	1 1/8
13/16	6.25	6 1/2	7/16	2 1/16	17.00	10	1 1/4
7/8	6.50	6 1/2	15/32	2 1/8	18.00	10	1 1/4
15/16	6.75	6 1/2	1/2	2 3/16	19.00	10	1 3/8
1	7.00	7	9/16	2 1/4	20.00	10	1 3/8
1 1/16	7.25	7	19/32	2 5/16	21.25	10	1 3/8
1 1/8	7.50	7	5/8	2 3/8	22.50	10	1 3/8
1 3/16	7.75	7	11/16	2 7/16	23.75	10	1 3/8
1 1/4	8.00	7	11/16	2 1/2	25.00	10	1 3/8
1 5/16	8.25	7 1/2	13/16	2 9/16	26.50	12	1 1/2
1 3/8	8.50	7 1/2	13/16	2 5/8	28.00	12	1 1/2
1 7/16	9.00	7 1/2	7/8	2 11/16	29.50	12	1 1/2
1 1/2	9.50	7 1/2	7/8	2 3/4	31.00	12	1 1/2
1 9/16	10.00	8	15/16	2 13/16	32.50	12	1 1/2
1 5/8	10.50	8	15/16	2 7/8	34.00	12	1 1/2
1 11/16	11.00	8	1	2 15/16	35.50	12	1 1/2
1 3/4	12.00	8	1	3	37.00	12	1 1/2
1 13/16	13.00	9	1 1/8				

Hollow Drills have a hole lengthwise through the shank connecting with the grooves in the drill. Unless otherwise ordered the shank is left blank, but it may be threaded and fitted to any length metal tube desired.

These drills are generally used in a lathe to drill long holes horizontally, the work being revolved. The end of the work to be drilled is supported by a steady rest. The drill is supported by a special rest arranged to have an oil-tight-bearing against the end of the work and at the back end an oil-tight packed bearing fitting the tubular shank of the drill. The hole in the rest forward of this packed bearing is enlarged to the full size of the drill, forming a chamber between the oil-tight bearings into which oil is fed under pressure to the outside of the tubular shank. Along this shank, and through the channels in the drill, it is forced to the cutting lips. Egress for the oil and chips is allowed through the flutes and the hollow shank.

Tubes are made to order and to fit any size drill. When ordering them give size of drill and depth of hole to be drilled.

"CORRECT CUTTING COMPOUNDS"—PAGE 96

Square Shank Ratchet Drills

Carbon Steel No. 111

Code Word—LABRAX—for No. 1 Shank
Code Word—LABRUM—for No. 2 Shank

High Speed Steel No. 414

Code Word—LIBERATE—for No. 1 Shank
Code Word—LIBERATING—for No. 2 Shank

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1/8	$0.90	$2.30	4 1/2	31/32	$2.40	$5.25	8
5/32	.95	2.35	4 1/2	1	2.55	5.50	8 1/2
3/16	.95	2.40	4 1/2	1 1/32	2.70	5.75	8 1/2
7/32	1.00	2.45	5	1 1/16	2.85	6.00	8 1/2
1/4	1.00	2.50	5	1 3/32	3.00	6.30	8 1/2
9/32	1.05	2.55	5	1 1/8	3.10	6.70	9
5/16	1.10	2.60	5	1 5/32	3.25	7.00	9
11/32	1.15	2.65	5	1 3/16	3.35	7.30	9
3/8	1.20	2.70	6	1 7/32	3.50	7.60	9
13/32	1.25	2.75	6 1/4	1 1/4	3.65	7.90	9
7/16	1.25	2.80	6 1/4	1 9/32	3.75	8.25	9
15/32	1.30	2.85	6 1/4	1 5/16	3.90	8.60	9
1/2	1.30	2.90	6 1/2	1 11/32	4.05	9.00	9
17/32	1.35	2.95	6 1/2	1 3/8	4.20	9.40	9
9/16	1.35	3.00	6 1/2	1 13/32	4.35	9.80	9
19/32	1.40	3.10	6 1/2	1 7/16	4.50	10.20	9
5/8	1.40	3.20	6 1/2	1 15/32	4.65	10.60	9
21/32	1.45	3.30	6 1/2	1 1/2	4.80	11.00	9
11/16	1.45	3.40	6 1/2	1 9/16	5.10	12.50	9
23/32	1.50	3.50	6 1/2	1 5/8	5.40	14.00	9
3/4	1.55	3.65	6 1/2	1 11/16	5.75	15.50	9
25/32	1.65	3.80	6 1/2	1 3/4	6.10	17.00	9
13/16	1.75	4.00	7	1 13/16	6.50	18.50	9
27/32	1.90	4.20	7	1 7/8	6.90	20.50	9
7/8	2.05	4.50	7 1/2	1 15/16	7.30	22.50	9
29/32	2.20	4.70	7 1/2	2	7.75	25.00	9
15/16	2.30	5.00	8				

No. 1 Shanks—3/8 inch by 5/8 inch by 1 1/2 inches long. No. 2 Shanks—1/2 inch by 3/4 inch by 1 3/4 inches long.

Unless otherwise specified No. 1 Shank will be furnished, except on High Speed Drills over 1 inch, which will be equipped with No. 2 Shank.

To avoid mistakes in ordering specify number, or dimensions, of shank.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Drills for Blacksmiths' Drill Presses

½-Inch Shank, Long Set

Carbon Steel No. 118 Code Word—LADLE

High Speed Steel No. 434 Code Word—LID

Shanks ½ inch Diameter and 2½ inches long

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1/8	$0.45	....	5 1/8	27/32	$2.40	$4.40	10 1/4
5/32	.45	....	5 3/8	7/8	2.60	4.75	10 1/2
3/16	.50	....	5 5/8	29/32	2.80	5.15	10 5/8
7/32	.55	....	5 7/8	15/16	3.00	5.50	10 3/4
1/4	.60	$1.10	6 1/8	31/32	3.25	5.90	10 7/8
9/32	.65	1.20	6 1/4	1	3.50	6.25	11
5/16	.70	1.30	6 3/8	1 1/32	3.75	6.75	11 1/8
11/32	.75	1.40	6 1/2	1 1/16	4.00	7.25	11 1/4
3/8	.80	1.50	6 3/4	1 3/32	4.25	7.75	11 1/2
13/32	.90	1.65	7	1 1/8	4.50	8.25	11 3/4
7/16	1.00	1.75	7 1/4	1 5/32	4.75	8.90	11 7/8
15/32	1.10	1.90	7 1/2	1 3/16	5.00	9.50	12
1/2	1.20	2.00	7 3/4	1 7/32	5.25	10.15	12 1/8
17/32	1.30	2.15	8	1 1/4	5.50	10.75	12 1/4
9/16	1.40	2.25	8 1/4	1 9/32	5.75	11.50	12 1/4
19/32	1.50	2.40	8 1/2	1 5/16	6.00	12.25	12 3/8
5/8	1.60	2.50	8 3/4	1 11/32	6.25	13.00	12 3/8
21/32	1.70	2.75	9	1 3/8	6.50	13.75	12 1/2
11/16	1.80	3.00	9 1/4	1 13/32	7.00	14.65	12 1/2
23/32	1.90	3.25	9 1/2	1 7/16	7.50	15.50	12 5/8
3/4	2.00	3.50	9 3/4	1 15/32	8.00	16.40	12 5/8
25/32	2.10	3.75	9 7/8	1 1/2	8.50	17.25	12 5/8
13/16	2.20	4.00	10				

High Speed Drills with ½-inch shanks will be furnished in sizes over ¾-inch diameter only at customer's risk, as we do not consider the shanks strong enough.

Unless otherwise specified these drills will always be furnished with flatted shanks.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

"PARAGON" DRILLS
HELPS AND HINTS
COUNTE SINKS
REAMER
"PARAD REAME
"PEERLE REAME
MISCI LANE

Drills for Blacksmiths' Drill Presses

½-Inch Shank, Short Set

Carbon Steel No. 120 Code Word—LADRONE

High Speed Steel No. 436 Code Word—LIEGE

Shanks ½ inch diameter and 2¼ inches long

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1/8	$0.45		4 7/8	27/32	$2.00	$3.15	6
5/32	.45		4 7/8	7/8	2.10	3.30	6
3/16	.50		5 5/8	29/32	2.20	3.50	6
7/32	.55		5 5/8	15/16	2.30	3.70	6
1/4	.60	$1.10	6	31/32	2.40	3.90	6
9/32	.65	1.20	6	1	2.50	4.10	6
5/16	.70	1.30	6	1 1/32	2.60	4.30	6
11/32	.75	1.40	6	1 1/16	2.70	4.50	6
3/8	.80	1.45	6	1 3/32	2.80	4.75	6
13/32	.85	1.55	6	1 1/8	2.90	5.00	6
7/16	.90	1.60	6	1 5/32	3.00	5.25	6
15/32	.95	1.70	6	1 3/16	3.10	5.50	6
1/2	1.00	1.75	6	1 7/32	3.20	5.80	6
17/32	1.05	1.90	6	1 1/4	3.30	6.10	6
9/16	1.10	2.05	6	1 9/32	3.45	6.40	6
19/32	1.20	2.20	6	1 5/16	3.60	6.70	6
5/8	1.30	2.30	6	1 11/32	3.75	7.00	6
21/32	1.40	2.40	6	1 3/8	3.90	7.40	6
11/16	1.50	2.50	6	1 13/32	4.05	7.80	6
23/32	1.60	2.65	6	1 7/16	4.20	8.20	6
3/4	1.70	2.75	6	1 15/32	4.35	8.60	6
25/32	1.80	2.90	6	1 1/2	4.50	9.00	6
13/16	1.90	3.00	6				

High Speed Drills with ½-inch shanks will be furnished in sizes over ¾-inch diameter only at customer's risk, as we do not consider the shanks strong enough.

Unless otherwise specified these drills will always be furnished with flatted shanks.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Drills for Blacksmiths' Drill Presses

5/8-Inch Shank (.648" Exact Diameter)

Carbon Steel No. 116

Code Word—LADDER

High Speed Steel No. 431

Code Word—LICORICE

Shanks are 2¼ inches long and .648 inch exact diameter—commonly called 5/8 inch

Diam eter Inches	Price Each		Length Over All Inches	Diam- eter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1/8	$0.50		4 7/8	27/32	$2.00	$3 15	6
5/32	.55		4 7/8	7/8	2.10	3 30	6
3/16	.60		5 5/8	29/32	2.20	3 50	6
7/32	.65		5 5/8	15/16	2.30	3 70	6
1/4	.70	$1 20	6	31/32	2.40	3 90	6
9/32	.75	1 30	6	1	2.50	4 10	6
5/16	.80	1 40	6	1 1/32	2.60	4 30	6
11/32	.85	1 50	6	1 1/16	2.70	4 50	6
3/8	.90	1 55	6	1 3/32	2.80	4 75	6
13/32	.95	1 65	6	1 1/8	2.90	5 00	6
7/16	1.00	1 70	6	1 5/32	3.00	5 25	6
15/32	1.05	1 80	6	1 3/16	3.10	5 50	6
1/2	1.10	1 85	6	1 7/32	3.20	5 80	6
17/32	1.15	1 95	6	1 1/4	3.30	6 10	6
9/16	1.20	2 05	6	1 9/32	3.45	6 40	6
19/32	1.25	2 20	6	1 5/16	3.60	6 70	6
5/8	1.30	2 30	6	1 11/32	3.75	7 00	6
21/32	1.40	2 40	6	1 3/8	3.90	7 40	6
11/16	1.50	2 50	6	1 13/32	4.05	7 80	6
23/32	1.60	2 65	6	1 7/16	4.20	8 20	6
3/4	1.70	2 75	6	1 15/32	4.35	8 60	6
25/32	1.80	2 90	6	1 1/2	4.50	9.00	6
13/16	1.90	3.00	6				

High Speed Drills with 5/8-inch shank will be furnished in sizes over 3/4-inch diameter only at customer's risk, as we do not consider the shanks strong enough.

Unless otherwise specified these drills will always be furnished with flatted shanks.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 114—Bit Stock Drills for Metal or Wood

Code Word—LACKEY

Diameter Inches	Price per Dozen	Length Over All Inches	Diameter Inches	Price per Dozen	Length Over All Inches
1/16	$2.50	3 5/16	15/32	$11.75	6 3/4
5/64	2.60	3 7/16	1/2	13.00	7
3/32	2.70	3 9/16	17/32	14.25	7 1/4
7/64	2.85	3 11/16	9/16	15.50	7 1/2
1/8	3.00	3 13/16	19/32	16.75	7 1/2
9/64	3.25	3 15/16	5/8	18.00	7 1/2
5/32	3.50	4 1/16	21/32	19.50	7 1/2
11/64	3.75	4 3/16	11/16	21.00	7 1/2
3/16	4.00	4 5/16	23/32	22.50	7 1/2
13/64	4.25	4 3/4	3/4	24.00	7 1/2
7/32	4.50	4 3/4	25/32	25.50	7 1/2
15/64	4.75	5	13/16	27.00	7 1/2
1/4	5.00	5	27/32	28.50	7 1/2
17/64	5.50	5 1/4	7/8	30.00	7 1/2
9/32	6.00	5 1/4	29/32	31.50	7 1/2
19/64	6.50	5 1/2	15/16	33.00	7 1/2
5/16	7.00	5 1/2	31/32	34.50	7 1/2
21/64	7.50	5 3/4	1	36.00	7 1/2
11/32	8.00	5 3/4	1 1/16	39.00	7 1/2
3/8	8.50	6	1 1/8	42.00	7 1/2
13/32	9.25	6 1/4	1 3/16	45.00	7 1/2
7/16	10.50	6 1/2	1 1/4	48.00	7 1/2

Sizes 1/16 to 3/8 inch inclusive, packed one dozen to a box. Broken packages 20% extra.

For Bit Stock Drills in Sets see pages 68, 69.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 114E—Bell Hangers' and Electricians' Bits

Code Word—LACTEAL

THE NUMBERS INDICATE THE SIZES IN 32ds OF AN INCH

No.	12-INCH	18-INCH	24-INCH	30-INCH	36-INCH
	Dozen	Dozen	Dozen	Dozen	Dozen
6	$7.50	$10.00	$12.50	$15.00	$17.50
8	8.00	10.50	13.00	15.50	18.00
10	8.75	11.00	13.50	16.00	18.50
12	9.50	12.00	14.50	17.00	19.50
14	10.50	13.00	15.50	18.00	20.50
16	12.00	14.50	17.00	19.50	22.00
18	13.50	16.00	18.50	21.00	23.50
20	15.25	17.75	20.25	22.75	25.25
22	17.00	19.50	22.00	24.50	27.00
24	19.00	21.50	24.00	26.50	29.00
26	21.00	23.50	26.00	28.50	31.00
28	23.00	25.50	28.00	30.50	33.00
30	25.00	27.50	30.00	32.50	35.00
32	27.50	30.00	32.50	35.50	38.00
34	30.50	33.00	35.50	39.00	42.00
36	33.00	36.00	39.00	42.50	47.00

No. 114F—Electricians' Bits and Fish Wire Combined

Smith's Patent, Jan. 25, 1898
Code Word—LACTIC

THE NUMBERS INDICATE THE SIZES IN 32ds OF AN INCH

No.	12-INCH	18-INCH	24-INCH	30-INCH	36-INCH
	Dozen	Dozen	Dozen	Dozen	Dozen
6	$9.35	$12.50	$15.65	$18.75	$21.90
8	10.00	13.10	16.25	19.35	22.50
10	10.95	13.75	16.90	20.00	23.15
12	11.90	15.00	18.15	21.20	24.40
14	13.15	16.25	19.40	22.50	25.65
16	15.00	18.10	21.25	24.35	27.50
18	16.90	20.00	23.15	26.25	29.40
20	19.05	22.20	25.30	28.45	31.55
22	21.25	24.40	27.50	30.65	33.75
24	23.75	26.90	30.00	33.15	36.25

By means of the holes drilled through the center web of these bits, electricians can fish their wires without the use of a secondary tool for that purpose. All bits up to and including $\frac{1}{16}$ inch diameter have "fish holes" for No. 14 wire, after the insulation has been removed. Larger bits will be provided with larger holes, if required. All our bits are made from the best steel, and are the finest finished tools on the market.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 114A—Wood Bits for Brace

Code Word—LACONIC

Size No.	Price per Doz.	Size No.	Price per Doz.	Size No.	Price per Doz.
2/32	$3.25	11/32	$6.50	19/32	$11.75
3/32	3.25	12/32	7.00	20/32	12.50
4/32	3.25	13/32	7.50	22/32	14.50
5/32	3.50	14/32	8.00	24/32	16.50
6/32	4.00	15/32	8.75	26/32	18.50
7/32	4.50	16/32	9.50	28/32	21.00
8/32	5.00	17/32	10.25	30/32	24.00
9/32	5.50	18/32	11.00	32/32	27.00
10/32	6.00				

Sizes 1/16 to 3/8 inch inclusive, packed one dozen to a box. Broken packages 20% extra.

For Wood Bits in Sets see page 68.

No. 122—Straight Shank Machine Bits for Wood

Code Word—LADY

Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches
1/8	$0.40	3	21/32	$1.60	6 3/4
5/32	.45	3 1/4	11/16	1.70	7
3/16	.50	3 1/2	23/32	1.80	7 1/4
7/32	.55	3 3/4	3/4	1.90	7 1/2
1/4	.60	4	25/32	2.00	7 3/4
9/32	.65	4 1/4	13/16	2.10	8
5/16	.70	4 1/2	27/32	2.30	8 1/4
11/32	.75	4 3/4	7/8	2.50	8 1/2
3/8	.80	5	29/32	2.70	8 3/4
13/32	.85	5 1/4	15/16	2.90	9
7/16	.90	5 1/2	31/32	3.00	9 1/4
15/32	1.00	5 3/4	1	3.25	9 1/2
1/2	1.10	6	1 1/16	3.75	11 1/4
17/32	1.20	6 1/8	1 1/8	4.25	11 3/4
9/16	1.30	6 1/4	1 3/16	4.75	12
19/32	1.40	6 3/8	1 1/4	5.25	12 1/2
5/8	1.50	6 1/2			

No. 122A—Machine Bits for Wood

Fitting Blacksmiths' Drill Presses

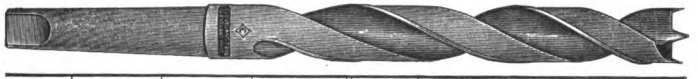
Code Word—LADYSHIP

Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches
1/8	$0.50	4 5/8	15/32	$1.10	7 1/2	13/16	$2.20	10
5/32	.55	4 7/8	1/2	1.20	7 3/4	27/32	2.40	10 1/4
3/16	.60	5	17/32	1.30	8	7/8	2.60	10 1/2
7/32	.65	5 1/4	9/16	1.40	8 1/4	29/32	2.80	10 5/8
1/4	.70	6 1/8	19/32	1.50	8 1/2	15/16	3.00	10 3/4
9/32	.75	6 1/4	5/8	1.60	8 3/4	31/32	3.25	10 7/8
5/16	.80	6 3/8	21/32	1.70	9	1	3.50	11
11/32	.85	6 1/2	11/16	1.80	9 1/4	1 1/16	4.00	11 1/4
3/8	.90	6 3/4	23/32	1.90	9 1/2	1 1/8	4.50	11 3/4
13/32	.95	7	3/4	2.00	9 3/4	1 3/16	5.00	12
7/16	1.00	7 1/4	25/32	2.10	9 7/8	1 1/4	5.50	12 1/2

The above Drills have Shanks 1/2 inch in diameter and 2 1/2 inches long.

No. 122B—Machine Bits for Wood, with Taper Shank

Code Word—LAFFERTY



Diameter Inches	Price Each	Length Over All Inches	Shank Taper	Diameter Inches	Price Each	Length Over All Inches	Shank Taper
1/8	$0.50	4 5/8		21/32	$1.70	9	
5/32	.55	4 7/8		11/16	1.80	9 1/4	
3/16	.60	5		23/32	1.90	9 1/2	
7/32	.65	5 1/4		3/4	2.00	9 3/4	
1/4	.70	6 1/8		25/32	2.10	9 7/8	No. 2
9/32	.75	6 1/4		13/16	2.20	10	
5/16	.80	6 3/8		27/32	2.40	10 1/4	
11/32	.85	6 1/2	No. 1	7/8	2.60	10 1/2	
3/8	.90	6 3/4		29/32	2.80	10 5/8	
13/32	.95	7		15/16	3.00	10 3/4	
7/16	1.00	7 1/4		31/32	3.25	10 7/8	
15/32	1.10	7 1/2		1	3.50	11	
1/2	1.20	7 3/4		1 1/16	4.00	11 1/4	No. 3
17/32	1.30	8		1 1/8	4.50	11 3/4	
9/16	1.40	8 1/4		1 3/16	5.00	12	
19/32	1.50	8 1/2		1 1/4	5.50	12 1/2	
5/8	1.60	8 3/4	No. 2				

No. 168—Machine Bits for Wood

With McKnight Taper Shanks

Code Word—LANDSLIP

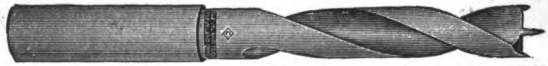
Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/8	$0 50	2 5/8	4 3/4	19/32	$1.25	2 5/8	4 3/4
5/32	.55	2 5/8	4 3/4	5/8	1.30	2 5/8	4 3/4
3/16	.60	2 5/8	4 3/4	21/32	1.35	2 5/8	4 3/4
7/32	.65	2 5/8	4 3/4	11/16	1.40	2 5/8	4 3/4
1/4	.65	2 5/8	4 3/4	23/32	1.45	2 5/8	4 3/4
9/32	.70	2 5/8	4 3/4	3/4	1.50	2 5/8	4 3/4
5/16	.70	2 5/8	4 3/4	25/32	1.60	2 5/8	4 3/4
11/32	.75	2 5/8	4 3/4	13/16	1.70	2 5/8	4 3/4
3/8	.80	2 5/8	4 3/4	27/32	1.80	2 5/8	4 3/4
13/32	.85	2 5/8	4 3/4	7/8	1.90	2 5/8	4 3/4
7/16	.90	2 5/8	4 3/4	29/32	2.00	2 5/8	4 3/4
15/32	.95	2 5/8	4 3/4	15/16	2.10	2 5/8	4 3/4
1/2	1.00	2 5/8	4 3/4	31/32	2.20	2 5/8	4 3/4
17/32	1.10	2 5/8	4 3/4	1	2.30	2 5/8	4 3/4
9/16	1.20	2 5/8	4 3/4				

The Shanks on above drills will not fit regular taper sockets

No. 169—Machine Bits for Wood

Shanks ½ inch diameter and 2 inches long

Code Word—LANDSON



Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/8	$0.50	2 3/8	5	19/32	$1.25	2 3/8	5
5/32	.55	2 3/8	5	5/8	1.30	2 3/8	5
3/16	.60	2 3/8	5	21/32	1.35	2 3/8	5
7/32	.65	2 3/8	5	11/16	1.40	2 3/8	5
1/4	.65	2 3/8	5	23/32	1.45	2 3/8	5
9/32	.70	2 3/8	5	3/4	1.50	2 3/8	5
5/16	.70	2 3/8	5	25/32	1.60	2 3/8	5
11/32	.75	2 3/8	5	13/16	1.70	2 3/8	5
3/8	.80	2 3/8	5	27/32	1.80	2 3/8	5
13/32	.85	2 3/8	5	7/8	1.90	2 3/8	5
7/16	.90	2 3/8	5	29/32	2.00	2 3/8	5
15/32	.95	2 3/8	5	15/16	2.10	2 3/8	5
1/2	1.00	2 3/8	5	31/32	2.20	2 3/8	5
17/32	1.10	2 3/8	5	1	2.30	2 3/8	5
9/16	1.20	2 3/8	5				

Special—Unless otherwise specified will always send Right Hand Bits

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 113—Coopers' Dowel Drills

Code Word—LACING

Diameter Inches	Price Per Dozen	Length Over All Inches	Diameter Inches	Price Per Dozen	Length Over All Inches
1/8	$1.50	2 1/2	1/2	$7.00	4 1/2
9/16	2.00	2 3/4	9/16	8.50	4 3/4
1/4	3.00	3	5/8	10.50	5
5/16	4.00	3 1/4	11/16	12.50	5 1/2
3/8	5.00	3 3/4	3/4	15.00	6
7/16	6.00	4			

No. 113A—Straight Shank Drills for Wood

Code Word—LACK

These Drills are for Wood—not for Metal. Do not mistake these drills as intended for metal on account of their short points. Tests made at this factory, supplemented by tests by a number of our customers, have demonstrated that drills pointed with an included angle of 135 degrees are very much superior to the old style long-pointed drills for *all* kinds of machine drilling in wood. When regrinding these drills the 135 degree angle to the point should be maintained.

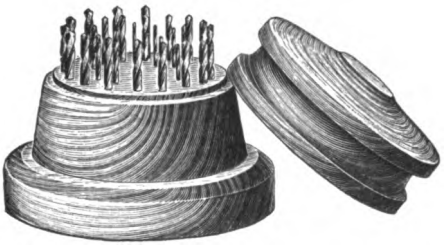
Diameter Inches	Price Per Dozen	Length Over All Inches	Diameter Inches	Price Per Dozen	Length Over All Inches
1/32	$1.50	1 1/2	9/32	$3.80	4 1/4
1/16	1.60	2 1/2	5/16	4.35	4 1/2
3/32	1.70	2 3/4	11/32	5.05	4 3/4
1/8	1.80	3	3/8	6.00	5
5/32	1.90	3 1/4	13/32	7.00	5 1/4
9/16	2.25	3 1/2	7/16	8.50	5 1/2
7/32	2.75	3 3/4	15/32	10.00	5 3/4
1/4	3.25	4	1/2	12.00	6

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 10—Jewelers' Drill Sets

Mounted in Mahogany Cases

Code Word—PARIAL



Set Contains 36 Drills No. 30 (1/8 in.) to No. 65 Steel Wire Gauge
Price, with Drills Complete, $8.00

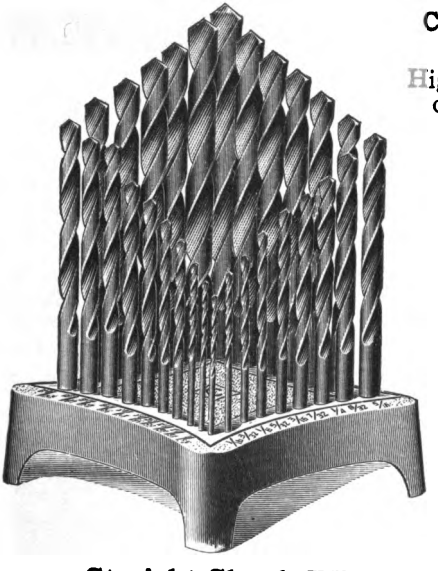
PRICES OF DRILLS IN SETS

For Code Words See Page 10

		Price per Set	
		Mounted on Stand	Not Mounted
No. 1	Taper shank drills 1/4 to 1 inch by 16ths	.....	$22.40
No. 2	Taper shank drills 3/4 to 1 1/4 inch by 16ths	.....	40.10
No. 3	Taper shank drills 3/8 to 3/4 inch by 32nds and 11/32 to 1 1/4 inch by 16ths	.....	48.50
No. 5	Short set straight shank drills 1/64 to 1/2 inch by 64ths, mounted on maple blocks (block only, $1.00)	$13.50	12.50
No. 6	Short set straight shank drills 1/32 to 1/2 inch by 32nds, mounted on maple blocks (block only, $1.00)	8.00	7.00
No. 7	Wire Gauge drills No. 1 to No. 60, short set straight shank drills 1/4 to 3/4 inch by 32ds mounted on maple blocks (block only, $1.25)	14.50	13.25
No. 8	Wire gauge drills No. 1 to No. 60, mounted on maple blocks (block only, $1.25)	12.50	10.85
No. 9	Wire gauge drills alternate Nos. from 1 to 59, mounted on maple blocks (block only, $1.00)	7.00	6.00
No. 10	Jewelers' set of 36 drills, No. 30 (1/8 inch) to No. 65, wire gauge in mahogany case with cap (case only, $2.00)	8.00	6.00
No. 11	Straight shank drills, letter size A to Z, mounted on maple blocks (blocks only, $1.00)	12.00	11.00
No. 13	Bit stock drills, 1/64 to 1/4 inch by 32ds	4.25	.....
	1/64 to 1/4 inch by 16ths in screw-top wooden boxes		
No. 13A	Wood bits for brace, 1/64 to 1/4 inch by 32ds	4.00	.....
	1/64 to 1/4 inch by 16ths in screw-top wooden boxes		
No. 13B	Wood bits for brace, 1/8 to 1/4 inch by 32ds	3.70	.....
	1/64 to 1/4 inch by 16ths in corduroy silk cases		
No. 14B	Bit stock drills, 1/8 to 1/4 inch by 32ds	4.35	.....
	1/64 to 1/4 inch by 16ths in leatherette cases		
No. 18	Short set straight shank drills 1/64 to 1/4 by 64ths, contained in convenient pocket size package	1.60	.....
No. 50	Short set straight shank drills 1/64 to 1/2 inch by 64ths, mounted on metal stands (stand only, $2.40)	15.00	12.50
No. 60	Short set straight shank drills 1 m/m to 6.5 m/m by .1 m/m on metal stands (stand only, $2.40)	13.50	11.10
No. 80	Wire gauge drills No. 1 to No. 60, mounted on metal stands (stand only, $2.40)	13.25	10.85
	Set of drills for case 43 1/2A, 1/64 to 11/32 inch by 32ds. List No. 120	.....	9.30
	Set of drills for case 43 1/2B, 1/32 to 11/32 inch by 32ds only. List No. 120	.....	13.25
	Set of drills for case 43 1/2C, 1/8 to 1 1/64 inch by 32ds. List No. 120	.....	39.80

"SPEED AND FEED TABLE" ON PAGE 101

Jobbers' Straight Shank Drill Set



Carbon Steel No. 50
Code Word—PARLOR

High Speed Steel No. 54
Code Word—PARLORISH

This set comprises all the sizes of Jobbers' straight shank drills from 1/16 inch to 1/2 inch, inclusive, by 64ths. Each drill fits in a hole plainly marked with its size.

As all the 32nd sizes are on one side and the 64ths sizes on the opposite side, selection is made easy.

No. 50 Set With Stand..... $15.00
No. 54 Set Without Stand... 26.20
Stand Only.... 2.40

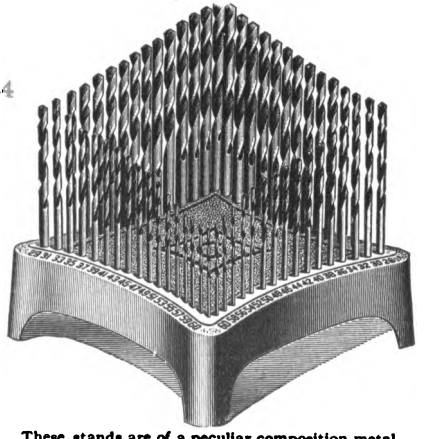
Straight Shank Wire Gauge Drill Set

Carbon Steel No. 80
Code Word—PARODY

High Speed Steel No. 84
Code Word—PAROSMIA

This set comprises all the sizes of straight shank drills, steel wire gauge, from No. 1 to 60, inclusive. The size drill fitting each hole is plainly marked on the stand. As even numbers are placed on one side and odd on the other, selection is made easy.

No. 80 Set With Stand.....$13.25
No. 84 Set Without Stand..... 30.60
Stand Only..... 2.40



These stands are of a peculiar composition metal, admirably adapted for the purpose and will not rust. The finish is in oxidized copper, making a very beautiful and lasting effect. They are especially useful in tool rooms and on mechanics' benches.

"DRILL BREAKAGE—A COMMON CAUSE"—PAGE 97

Wood Bits for Brace

No. 13B Set

Code Word—PARK

This set consists of the following sizes Wood Bits:

1/8, 5/32, 3/16, 7/32, 1/4, 5/16, 3/8 inch.

They are contained in an elegant flat case, covered with dark green corduroy silk, and beautifully embossed in gold.

Size, 8¾ x 3½ x ¾ inches.

Price complete, $3.70

No. 13A Set

Code Word—PARISIN

This set consists of the following sizes Wood Bits:

1/16, 3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16, 3/8 inch.

The round polished hardwood box that goes with this set is 2½ inches in diameter and 8¾ inches long.

Price complete, $4.00

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Bit Stock Drills for Metal or Wood

No. 13 Set

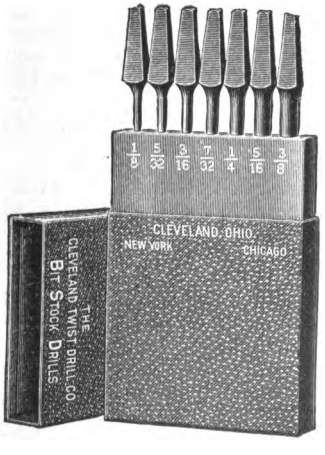
Code Word—PARISH

This set consists of the following sizes Bit Stock Drills:

$\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{7}{32}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$ in.

They are contained in a handsome hardwood box, 2½ inches in diameter and 6½ inches long.

Price complete, $4 25



No. 14B Set

Code Word—PARLANCE

This set consists of the following sizes Bit Stock Drills:

$\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{7}{32}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$ inch.

The flat case that goes with this set is covered with a strong leatherette, green in color, gold embossed.

Size, 7 x 3½ x ¾ inches.

Price complete, $4.35

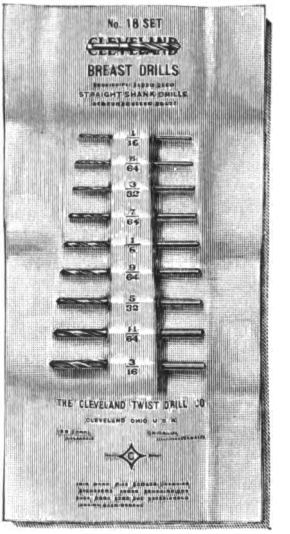
No. 18 Set

Code Word—PARLANCIDE

Drill Set No. 18 is designed particularly for the autoist or garageman. Its nine straight shank drills, $\frac{1}{16}$" to $\frac{3}{16}$" inclusive, by 64ths, roll into a snug, flat package which fits into a handy vest-pocket envelope of tough, non-tearing fiber.

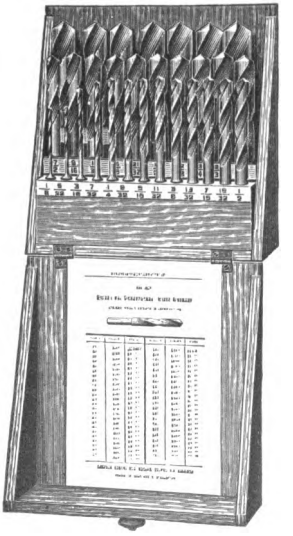
The package keeps them in perfect condition—ready for instant use with no mussing around in the tool box for missing sizes.

The complete set, ready for tool kit..... ...$1.60



Wheelwrights' Drill Cases

STYLES A, B, C



These cases can be placed on a shelf or screwed fast to a post or wall. They are made of oak, finely polished, and will be an ornament to any shop. Always ready—a place for each drill and each drill in its place. Furnished in three sizes, adapted to hold sets of the ½-inch shank Blacksmiths' Drills, List No. 120, as follows:

No. 43½A holds 12 drills, from $\frac{3}{16}$ to $\frac{17}{32}$ inch, inclusive, advancing by thirty-seconds
Price of case.....$1.25
Price of drills for case 43½A.. 9.30

No. 43½B holds 12 drills, from $\frac{5}{32}$ to $\frac{27}{32}$ inch, inclusive, advancing by thirty-second sizes only. Price of case.....$ 1.25
Price of drills for case 43½B. 13.25

No. 43½C holds 30 drills, from ⅛ to $1\frac{1}{32}$ inches, inclusive, advancing by thirty-seconds. Price of case....$ 1.50
Price of drills for case 43½C. 39.80

"IS FILING A TEST OF DRILL QUALITY?"—PAGE 96

No. 06—Drill Drawers

Size No. 1 No. 2 No. 3 No. 4 No. 5 No. 6

These Interchangeable Compartment Drawers are intended primarily for use in a store or shop where space does not permit the use of our regular cases. Owing to their uniformity they can be attractively arranged on shelves or counters.

The drawers have quartered oak fronts, with sides, bottoms and partitions of whitewood. The oak fronts have a fine Golden Oak furniture finish which, together with the bronze label holders and drawer pulls, gives them a handsome appearance.

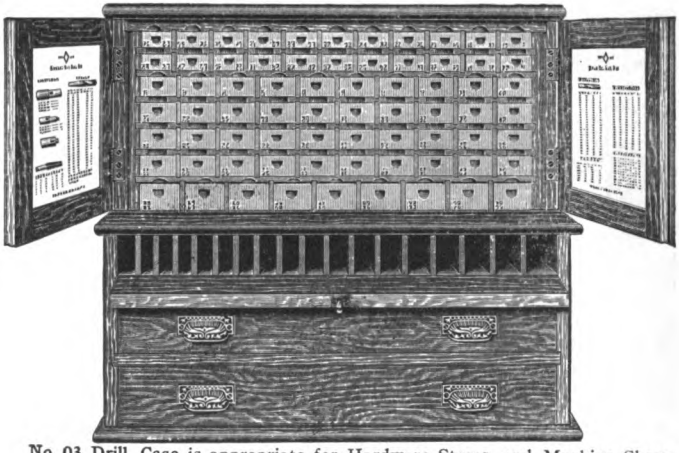
For Code Words See Page 234

Size No.	Price Each	Outside Measurements			Interchangeable Compartments
		Width Inches	Height Inches	Length Inches	
1	$0.50	3 3/16	3 7/32	15 1/2	2, 3, 4, 5, 6 or 7
2	.50	3 3/4	3 3/16	15 1/2	2, 3 or 4
3	.60	4 1/2	3 15/16	15 1/2	1, 2, 3, 4, 5 or 6
4	.70	5 5/8	3 15/16	15 1/2	1, 2, 3, 4, 5 or 6
5	.80	5 5/8	4 15/16	15 1/2	1, 2, 3, 4, 5 or 6
6	.90	7 1/2	4 15/16	15 1/2	1, 2, 3, 4, 5 or 6

WHEN A SET SCREW SNAPS SEE PAGE 174

Drill Cases

No. 03. Code Word—LAAGER



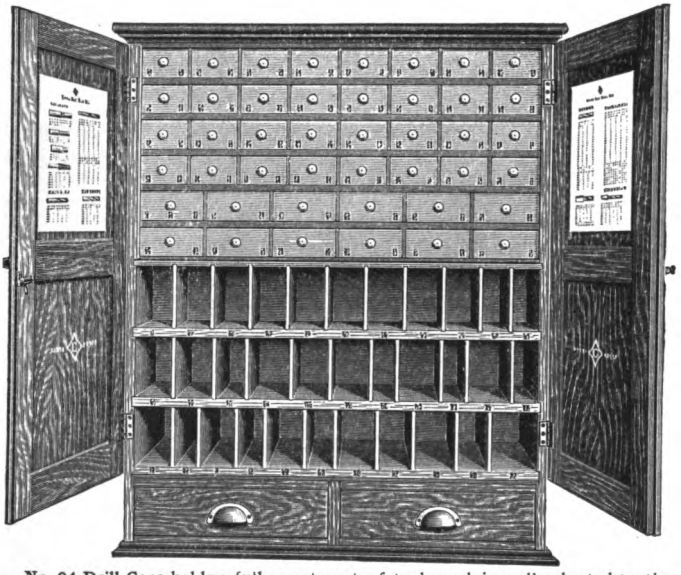
No. 03 Drill Case is appropriate for Hardware Stores and Machine Shops where a large variety of tools is not necessary. It will carry a full assortment of Straight Shank and Wire Gauge Drills, Taper Shank Drills ¼ to ¾ inch by 32nds, 1⅛ to 1¼ inches by 16ths, and the necessary sockets. **Size**—28 inches wide by 12½ inches deep and 26 inches high, outside measurements. **Appearance—Front** and **sides** quarter sawed oak with golden oak finish. **Drawers**—whitewood, unfinished.

No. 05. Code Word—LAAKLAND

No. 05 **Drill Case** is specially arranged to carry Blacksmiths' Drills, Bit Stock Drills and Wood Bits **Size**—28 inches wide by 13 inches deep and 30 inches high, outside measurements. **Appearance—Front** and **sides** quarter sawed oak, golden oak finish. Inside woodwork of whitewood. **Prices quoted upon application.**

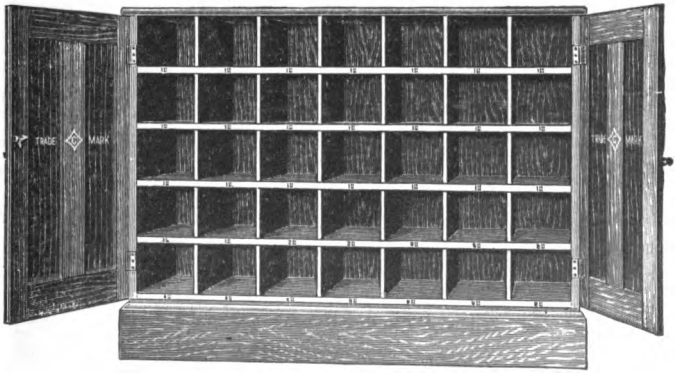
Drill Cases

No. 04. Code Word—LAAGERED



No. 04 Drill Case holds a full assortment of tools and is well adapted to the Hardware Merchant or Supply Dealer. The **Drawers** on top carry all sizes of Wire Gauge and Jobbers' Straight Shank Drills. The pigeonholes are intended for Taper Shank Drills, Wood Bits, etc. The two lower drawers for Sockets, Sleeves, etc. **Size**—37 inches wide by 16 inches deep and 44 inches high, outside measurements. **Appearance**—**Front** and **sides** are made of quarter sawed oak and finished in golden oak. Inside woodwork of whitewood.

No. 04½. Code Word—LAAGERING



No. 04½ Drill Case is not intended as a complete case in itself. Its purpose is to form a base for the No. 04 Drill Case to set upon, and, when additional space is required, to carry a larger stock. **Size**—48 inches wide by 22 inches deep and 37 inches high, outside measurements. **Appearance**—Same as No. 04. **Prices quoted upon application.**

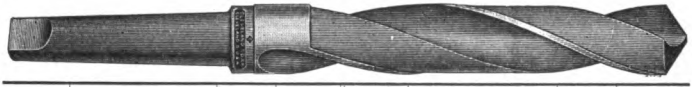
Millimeter Size Taper Shank Drills

Carbon Steel No. 1152

Code Word—LANDMAN

High Speed Steel No. 404

Code Word—LIBATED



Diameter m/m	Price Each Carbon Steel	Price Each High Speed	Length Over All m/m	Shank Taper
3	$0.45	$0.90	130	
3½	.45	.90	133	
4	.50	.90	140	
4½	.50	.90	146	
5	.55	1.00	149	
5½	.55	1.00	149	
6	.60	1.10	155	
6½	.65	1.20	155	
7	.65	1.20	159	
7½	.70	1.30	159	
8	.75	1.40	162	
8½	.75	1.40	162	No. 1
9	.80	1.50	172	
9½	.80	1.50	172	
10	.90	1.65	178	
10½	1.00	1.75	178	
11	1.00	1.75	184	
11½	1.10	1.90	184	
12	1.20	2.00	191	
12½	1.20	2.00	197	
13	1.30	2.15	203	
13½	1.40	2.25	203	
14	1.40	2.25	210	
14½	1.50	2.40	216	
15	1.50	2.40	216	
15½	1.60	2.50	216	
16	1.70	2.75	222	
16½	1.70	2.75	222	
17	1.80	3.00	235	
17½	1.90	3.25	235	No. 2
18	1.90	3.25	241	
18½	2.00	3.50	241	
19	2.00	3.50	247	
19½	2.10	3.75	247	
20	2.20	4.00	254	
20½	2.20	4.00	254	
21	2.40	4.40	260	
21½	$2.60	$4.75	260	
22	2.60	4.75	267	No. 2
22½	2.80	5.15	267	
23	2.80	5.15	270	
23½	3.00	5.50	270	
24	3.25	5.90	276	
24½	3.25	5.90	276	
25	3.50	6.25	279	
25½	3.75	6.75	279	
26	3.75	6.75	282	
26½	4.00	7.25	282	
27	4.25	7.75	286	
27½	4.25	7.75	286	No. 3
28	4.50	8.25	298	
28½	4.50	8.25	298	
29	4.75	8.90	302	
29½	5.00	9.50	302	
30	5.00	9.50	305	
30½	5.25	10.15	305	
31	5.50	10.75	308	
31½	5.50	10.75	308	
32	5.75	11.50	359	
32½	5.75	11.50	359	
33	6.00	12.25	362	
33½	6.25	13.00	362	
34	6.25	13.00	365	
34½	6.50	13.75	365	
35	7.00	14.65	368	
35½	7.00	14.65	368	No. 4
36	7.50	15.50	375	
36½	7.50	15.50	375	
37	8.00	16.40	378	
37½	8.50	17.25	378	
38	8.50	17.25	381	
38½	9.00	18.15	381	
39	9.50	19.00	384	
39½	9.50	19.00	384	

Continued on next page

NEED SPECIAL SHANKS? SEE PAGE 200

Millimeter Size Taper Shank Drills

Carbon Steel No. 1152

Code Word—LANDMAN

High Speed Steel No. 404

Code Word—LIBATED

Diameter m/m	Price Each Carbon Steel	Price Each High Speed	Length Over All m/m	Shank Taper
40	$10.00	$20.00	390	
40½	10.50	21.00	390	
41	10.50	21.00	394	
41½	11.00	22.00	394	
42	11.00	22.00	397	
42½	11.50	23.00	397	
43	12.00	24.00	400	
43½	12.00	24.00	400	
44	12.50	25.00	406	
44½	13.25	26.25	406	
45	13.25	26.25	409	No.
45½	14.00	27.50	409	4
46	14.00	27.50	409	
46½	14.75	28.75	409	
47	15.50	30.00	419	
47½	15.50	30.00	419	
48	16.25	31.25	419	
48½	17.00	32.50	419	
49	17.00	32.50	419	
49½	17.75	33.75	419	
50	17.75	33.75	428	
50½	18.50	35.00	428	
51	19.25	36.25	428	
51½	19.25	36.25	428	
52	20.00	37.50	435	
52½	20.75	38.75	435	
53	20.75	38.75	435	
53½	21.50	40.00	435	
54	22.25	41.25	445	No.
54½	22.25	41.25	445	5
55	23.00	42.50	445	
55½	23.00	42.50	445	
56	23.75	43.75	445	
56½	24.50	45.00	445	
57	24.50	45.00	445	
57½	25.25	47.50	445	

Diameter m/m	Price Each Carbon Steel	Price Each High Speed	Length Over All m/m	Shank Taper
58	$26.00	$50.00	445	
58½	26.00	50.00	445	
59	26.75	52.50	457	
59½	26.75	52.50	457	
60	27.50	55.00	457	
60½	28.25	57.50	457	
61	28.25	57.50	470	
61½	29.00	60.00	470	
62	29.75	62.50	483	
62½	29.75	62.50	483	
63	30.50	65.00	483	
63½	30.50	65.00	483	
64	31.25	67.50	483	
64½	32.00	70.00	483	
65	32.00	70.00	489	
65½	33.00	72.50	489	
66	34.00	75.00	495	
66½	34.00	75.00	495	No.
67	35.00	77.50	495	5
67½	36.00	80.00	495	
68	36.00	80.00	508	
68½	37.00	82.50	508	
69	37.00	82.50	521	
69½	38.00	85.00	521	
70	39.25	87.50	521	
70½	39.25	87.50	521	
71	40.50	90.00	521	
71½	41.75	92.50	521	
72	41.75	92.50	521	
72½	43.00	95.00	521	
73	43.00	95.00	533	
73½	44.25	97.50	533	
74	45.50	100.00	533	
74½	45.50	100.00	533	
75	46.75	102.50	533	
75½	48.00	105.00	533	
76	48.00	105.00	559	

WHEN A TANG SNAPS, SEE PAGE 24

"PARAGON" DRILLS
HELPS AND HINTS
COUNTER SINKS
REAMERS
"PARADOX" REAMERS
"PEERLESS" REAMERS
MISCELLANEOUS
CODE

Millimeter Size Straight Shank Drills, Long Set

Carbon Steel No. 1153

Code Word—LANDMARK

High Speed Steel No. 416

Code Word—LIBIDIOUS

Diameter ⅟₁₆	Price Each		Length Over All ⅟₁₆	Diameter ⅟₁₆	Price Each		Length Over All ⅟₁₆
	Carbon Steel	High Speed			Carbon Steel	High Speed	
3	$0.45	$0.90	130	21½	$2.60	$4.75	260
3½	.45	.90	133	22	2.60	4.75	267
4	.50	.90	140	22½	2.80	5.15	267
4½	.50	.90	146	23	2.80	5.15	270
5	.55	1.00	149	23½	3.00	5.50	270
5½	.55	1.00	149	24	3.25	5.90	276
6	.60	1.10	155	24½	3.25	5.90	276
6½	.65	1.20	155	25	3.50	6.25	279
7	.65	1.20	159	25½	3.75	6.75	279
7½	.70	1.30	159	26	3.75	6.75	282
8	.75	1.40	162	26½	4.00	7.25	282
8½	.75	1.40	162	27	4.25	7.75	286
9	.80	1.50	172	27½	4.25	7.75	286
9½	.80	1.50	172	28	4.50	8.25	298
10	.90	1.65	178	28½	4.50	8.25	298
10½	1.00	1.75	178	29	4.75	8.90	302
11	1.00	1.75	184	29½	5.00	9.50	302
11½	1.10	1.90	184	30	5.00	9.50	305
12	1.20	2.00	191	30½	5.25	10.15	305
12½	1.20	2.00	197	31	5.50	10.75	308
13	1.30	2.15	203	31½	5.50	10.75	308
13½	1.40	2.25	203	32	5.75	11.50	359
14	1.40	2.25	210	32½	5.75	11.50	359
14½	1.50	2.40	216	33	6.00	12.25	362
15	1.50	2.40	216	33½	6.25	13.00	362
15½	1.60	2.50	216	34	6.25	13.00	365
16	1.70	2.75	222	34½	6.50	13.75	365
16½	1.70	2.75	222	35	7.00	14.65	368
17	1.80	3.00	235	35½	7.00	14.65	368
17½	1.90	3.25	235	36	7.50	15.50	375
18	1.90	3.25	241	36½	7.50	15.50	375
18½	2.00	3.50	241	37	8.00	16.40	378
19	2.00	3.50	247	37½	8.50	17.25	378
19½	2.10	3.75	247	38	8.50	17.25	381
20	2.20	4.00	254	38½	9.00	18.15	381
20½	2.20	4.00	254	39	9.50	19.00	384
21	2.40	4.40	260	39½	9.50	19.00	384

Continued on next page

"THE USE OF HIGH SPEED DRILLS"—PAGE 94-96

Millimeter Size Straight Shank Drills, Long Set

Carbon Steel No. 1153

Code Word—LANDMARK

High Speed Steel No. 416

Code Word—LIBIDIOUS

Diameter m/m	Price Each Carbon Steel	Price Each High Speed	Length Over All m/m	Diameter m/m	Price Each Carbon Steel	Price Each High Speed	Length Over All m/m
40	$10.00	$20.00	390	58½	$26.00	$50.00	445
40½	10.50	21.00	390	59	26.75	52.50	457
41	10.50	21.00	394	59½	26.75	52.50	457
41½	11.00	22.00	394	60	27.50	55.00	457
42	11.00	22.00	397	60½	28.25	57.50	457
42½	11.50	23.00	397	61	28.25	57.50	470
43	12.00	24.00	400	61½	29.00	60.00	470
43½	12.00	24.00	400	62	29.75	62.50	483
44	12.50	25.00	406	62½	29.75	62.50	483
44½	13.25	26.25	406	63	30.50	65.00	483
45	13.25	26.25	409	63½	30.50	65.00	483
45½	14.00	27.50	409	64	31.25	67.50	483
46	14.00	27.50	409	64½	32.00	70.00	483
46½	14.75	28.75	409	65	32.00	70.00	489
47	15.50	30.00	419	65½	33.00	72.50	489
47½	15.50	30.00	419	66	34.00	75.00	495
48	16.25	31.25	419	66½	34.00	75.00	495
48½	17.00	32.50	419	67	35.00	77.50	495
49	17.00	32.50	419	67½	36.00	80.00	495
49½	17.75	33.75	419	68	36.00	80.00	508
50	17.75	33.75	428	68½	37.00	82.50	508
50½	18.50	35.00	428	69	37.00	82.50	521
51	19.25	36.25	428	69½	38.00	85.00	521
51½	19.25	36.25	428	70	39.25	87.50	521
52	20.00	37.50	435	70½	39.25	87.50	521
52½	20.75	38.75	435	71	40.50	90.00	521
53	20.75	38.75	435	71½	41.75	92.50	521
53½	21.50	40.00	435	72	41.75	92.50	521
54	22.25	41.25	445	72½	43.00	95.00	521
54½	22.25	41.25	445	73	43.00	95.00	533
55	23.00	42.50	445	73½	44.25	97.50	533
55½	23.00	42.50	445	74	45.50	100.00	533
56	23.75	43.75	445	74½	45.50	100.00	533
56½	24.50	45.00	445	75	46.75	102.50	533
57	24.50	45.00	445	75½	48.00	105.00	533
57½	25.25	47.50	445	76	48.00	105.00	559
58	26.00	50.00	445				

"POINT GRINDING" ON PAGE 89

Millimeter Size Straight Shank Drills, Short Set

Carbon Steel No. 1154

Code Word—LANDS

High Speed Steel No. 420

Code Word—LICENTIATE

Diameter m/m	Price per Dozen		Length Over All m/m	Diameter m/m	Price per Dozen		Length Over All m/m
	Carbon Steel	High Speed			Carbon Steel	High Speed	
.5	$1.50		22	3.	$1.75	$5 90	70
.6	1.50		27	3.1	1.80	5 90	70
.7	1.50		32	3.2	1.80	6 10	71
.75	1.50		35	3.25	1.80	6 10	72½
.8	1.50		35	3.3	1.80	6 10	72½
.9	1.50		38	3.4	1.80	6 10	74
1.	1.50	$5 70	40	3.5	1.80	6 10	76
1.1	1.55	5 70	41	3.6	1.90	6 10	76
1.2	1.55	5 70	43	3.7	1.90	6 10	77½
1.25	1.55	5 70	45	3.75	1.90	6 10	79
1.3	1.60	5 70	45	3.8	1.90	6 10	79
1.4	1.60	5 70	46	3.9	1.90	6 10	81
1.5	1.60	5 70	48	4.	1.90	6 10	82
1.6	1.60	5 70	49	4.1	2.00	6 30	84
1.7	1.60	5 70	50½	4.2	2.00	6 30	86
1.75	1.60	5 70	51½	4.25	2.00	6 30	87
1.8	1.65	5 70	51½	4.3	2.00	6 30	87
1.9	1.65	5 70	54	4.4	2.00	6 30	89
2.	1.65	5 70	55	4.5	2.00	6 30	90
2.1	1.70	5 70	56	4.6	2.25	6 30	90
2.2	1.70	5 70	57	4.7	2.25	6 30	91
2.25	1.70	5 70	59	4.75	2.25	6 30	93
2.3	1.70	5 70	59	4.8	2.25	6 30	93
2.4	1.70	5 70	60	4.9	2.25	7 00	95
2.5	1.70	5 90	62	5.	2.25	7 00	97
2.6	1.75	5 90	63	5.1	2.60	7 00	97
2.7	1.75	5 90	65	5.2	2.60	7 00	97
2.75	1.75	5 90	67	5.25	2.60	7 00	97
2.8	1.75	5 90	67	5.3	2.60	7 00	97
2.9	1.75	5 90	68	5.4	2.60	7 00	98

Continued on next page

"PROPER SPEED FOR SMALL HOLES"—PAGE 95

Millimeter Size Straight Shank Drills, Short Set

Carbon Steel No. 1154

Code Word—LANDS

High Speed Steel No. 420

Code Word—LICENTIATE

Diameter m/m	Price per Dozen		Length Over All m/m	Diameter m/m	Price per Dozen		Length Over All m/m
	Carbon Steel	High Speed			Carbon Steel	High Speed	
5.5	$2.60	$7.00	98	8.1	$5.00	$12.00	121
5.6	2.95	7.00	98	8.2	5.00	12.00	121
5.7	2.95	7.00	101	8.25	5.00	12.00	121
5.75	2.95	7.00	102	8.3	5.00	12.00	121
5.8	2.95	7.00	102	8.4	5.00	12.00	122
5.9	2.95	7.00	103	8.5	5.00	12.00	122
6.	2.95	7.35	105	8.6	5.50	12.00	124
6.1	3.30	7.35	105	8.7	5.50	12.00	124
6.2	3.30	7.35	105	8.75	5.50	13.50	125
6.25	3.30	7.35	105	8.8	5.50	13.50	125
6.3	3.30	7.35	105	8.9	5.50	13.50	125
6.4	3.30	9.10	105	9.	5.50	13.50	127
6.5	3.30	9.10	105	9.1	6.00	13.50	127
6.6	3.65	9.10	106	9.2	6.00	13.50	129
6.7	3.65	9.10	108	9.25	6.00	13.50	129
6.75	3.65	9.10	109	9.3	6.00	13.50	129
6.8	3.65	9.10	109	9.4	6.00	13.50	130
6.9	3.65	9.10	109	9.5	6.00	13.50	132
7.	3.65	9.10	111	9.6	6.50	15.00	132
7.1	4.00	9.10	111	9.7	6.50	15.00	133
7.2	4.00	10.50	113	9.75	6.50	15.00	133
7.25	4.00	10.50	113	9.8	6.50	15.00	133
7.3	4.00	10.50	113	9.9	6.50	15.00	135
7.4	4.00	10.50	114	10.	6.50	15.00	135
7.5	4.00	10.50	116	10.5	7.25	17.00	140
7.6	4.50	10.50	116	11.	8.00	17.00	145
7.7	4.50	10.50	117	11.5	9.00	18.75	145
7.75	4.50	10.50	119	12.	10.00	20.00	151
7.8	4.50	10.50	119	12.5	11.00	20.00	155
7.9	4.50	10.50	121	13.	12.50	21.50	160
8.	4.50	10.50	121				

"INDICATION OF TOO GREAT SPEED"—PAGE 94

Millimeter Size Ratchet Drills

Carbon Steel No. 1111

Code Word—LACERATE—for No. 1 Shank
Code Word—LACHES—for No. 2 Shank

High Speed Steel No. 421

Code Word -LICENTIOUS - for No. 1 Shank
Code Word—LICHAM—for No. 2 Shank

Diameter ⅝	Price Each		Length Over All ⅝	Diameter ⅝	Price Each		Length Over All ⅝
	Carbon Steel	High Speed			Carbon Steel	High Speed	
5½	$1.00	$2.45	127	20½	$1.75	$4.00	178
6	1.00	2.50	127	21	1.90	4.20	178
6½	1.00	2.55	127	21½	1.95	4.50	190
7	1.05	2.55	127	22	2.05	4.50	190
7½	1.10	2.60	127	22½	2.15	4.70	190
8	1.10	2.65	127	23	2.20	4.70	190
8½	1.15	2.65	127	23½	2.25	5.00	203
9	1.20	2.70	153	24	2.30	5.25	203
9½	1.20	2.70	153	24½	2.40	5.25	203
10	1.25	2.75	159	25	2.50	5.50	216
10½	1.25	2.80	159	25½	2.60	5.75	216
11	1.25	2.80	159	26	2.70	5.75	216
11½	1.30	2.85	159	26½	2.75	6.00	216
12	1.30	2.90	159	27	2.85	6.30	216
12½	1.30	2.90	159	27½	3.00	6.30	216
13	1.35	2.95	159	28	3.05	6.70	229
13½	1.35	3.00	159	28½	3.10	6.70	229
14	1.35	3.00	159	29	3.25	7.00	229
14½	1.40	3.10	159	29½	3.30	7.30	229
15	1.40	3.10	159	30	3.35	7.30	229
15½	1.40	3.20	159	30½	3.40	7.60	229
16	1.45	3.30	159	31	3.50	7.90	229
16½	1.45	3.30	159	31½	3.65	7.90	229
17	1.45	3.40	159	32	3.75	8.25	229
17½	1.50	3.50	159	33	3.90	8.60	229
18	1.50	3.50	159	34	4.05	9.00	229
18½	1.55	3.65	159	35	4.20	9.80	229
19	1.55	3.65	159	36	4.50	10.20	229
19½	1.65	3.80	159	37	4.65	10.60	229
20	1.65	4.00	171	38	4.80	11.00	229

No. 1 Shanks 9½⅝ by 16⅝ by 38⅝ long.
No. 2 Shanks 12¾⅝ by 19⅝ by 44½⅝ long.
When ordering please state number of Shank.
Unless otherwise specified No. 1 Shank will be furnished.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 1114—Millimeter Size Bit Stock Drills

Code Word—LACQUER

Diameter m/m	Price per Dozen	Length Over All m/m	Diameter m/m	Price per Dozen	Length Over All m/m
1½	$2.50	86	13½	$15.50	184
2	2.70	76	14	15.50	191
2½	2.85	82½	14½	16.75	191
3	3.00	90½	15	16.75	191
3½	3.25	97	15½	18.00	191
4	3.75	103½	16	19.50	191
4½	4.00	111	16½	19.50	191
5	4.25	116	17	21.00	191
5½	4.50	121	17½	22.50	191
6	5.00	124	18	22.50	191
6½	5.50	127	18½	24.00	191
7	6.00	132	19	24.00	191
7½	6.50	135	19½	25.50	191
8	7.50	140	20	27.00	191
8½	8.00	144	20½	27.00	191
9	8.50	149	21	28.50	191
9½	8.50	152	21½	30.00	191
10	9.25	155	22	30.00	191
10½	10.50	160	22½	31.50	191
11	10.50	165	23	31.50	191
11½	11.75	168	23½	33.00	191
12	13.00	171	24	34.50	191
12½	13.00	176	24½	34.50	191
13	14.25	179	25	36.00	191

ALWAYS GIVE LIST NUMBER WHEN ORDERING

"Cleveland" Paragon
High Speed Flatwist Drills

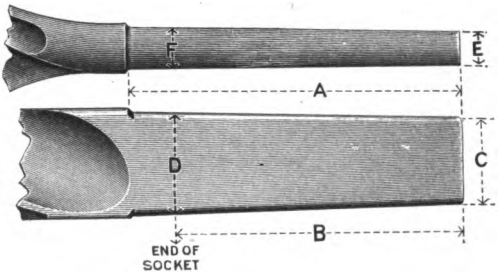
Detailed Index—Pages 4 to 17

Making the World's Drilling Record at Atlantic City in June, 1911, with a "Cleveland" "Paragon" High Speed Drill—57½ inches penetration per minute through cast iron.

"Paragon" High Speed Drills are not flat bars twisted while hot, but are twist drills forged from the original bar of high speed steel in special dies. This process, in addition to toughening the steel by additional "working," produces a drill with flutes correctly shaped according to the best practice, so that, when properly ground, it will have straight cutting lips and the maximum chip area.

You will be interested in the records of "Paragon" Drills shown on page 99.

"Paragon" Flat Taper Shanks



DIMENSIONS

No.	A Inches	B Inches	C Inches	D Inches	E Inches	F Inches	Taper per Foot	
							Flat Sides Inches	Round Edges Inches
1	1¾	1½	.400	.475	13/64	.257	7/16	.600
2	2¼	2	.600	.700	¼	.323	7/16	.602
3	3	2¾	.800	.938	5/16	.412	7/16	.602
4	3½	3	1.075	1.231	15/32	.577	7/16	.623
5	6½	5⅞	1.440	1.748	⅝	.839	7/16	.630
6	8⅞	8¼	2.064	2.494	¾	1.051	7/16	.626

The "Paragon" Flat Taper Shank is like a long tang except that it is tapered on the flat sides as well as on the round edges. The brunt of the torsional strain of driving is borne by the shank at the lower end of the socket, where the cross sectional area of the shank is greatest. A "Paragon" shank gives, for this reason, a very much stronger drive than the same size regular taper shank.

The "Paragon" Sockets, specially made for this flat taper shank, are both compact and inexpensive. They are furnished as Shell, Fitted or Rough Sockets and have the same outside dimensions as regular sockets and sleeves. By means of the flat tapered holes, accurately fitting the "Paragon" Flat Shanks, they center and drive the drills as true as regular taper sockets. The No. 5 and No. 6 "Paragon" Shanks fit regular spindles when used with the collet adapters shown on the following page.

"Paragon" Steel Collets

For Code Words See Page 238

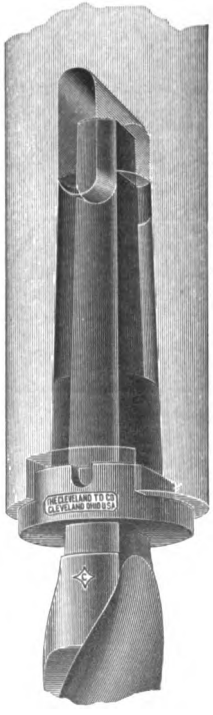
No. 900A Centering Collets

Code Word—LOWJABB

Patented November 22 1910

No. 900B Driving Collets

Code Word—LOWJABBER



The "Paragon" Driving Collets were designed to supply an extra strong and compact drive for large size "Flatwist" drills having No. 5 or No. 6 "Paragon" Flat Taper Shanks and to fit them directly to spindles with No. 5 or No. 6 Morse taper holes. The No. 5 and No. 6 "Paragon" Shanks are made the full length of regular taper shanks, the upper end of the shank fitting the driving slot in the spindle. A powerful additional drive is provided by means of two tongues projecting from the circular base of the Collet which mortise into a slot across the end of the spindle. By this means the driving strain is brought to the strongest part of the shank.

For driving heavy tools the spindles of the large size drill presses made by the Baker Bros. Co. of Toledo, Ohio, and The Colburn Machine Co. of Franklin, Pa., are provided with standard mortises which these Driving Collets will fit.

"Paragon" Centering Collets practically amount to interchangeable taper shanks and fit any spindle or socket having either No. 5 or No. 6 regular taper hole.

Always give size *and style* when ordering.

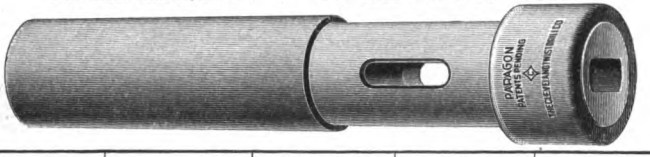
PRICES

No. 5 Collet, Style A or B.....$4.00
No. 6 Collet, Style A or B..... 7.50

A WORLD'S RECORD ON PAGE 82

No. 901—"Paragon" Rough Socket

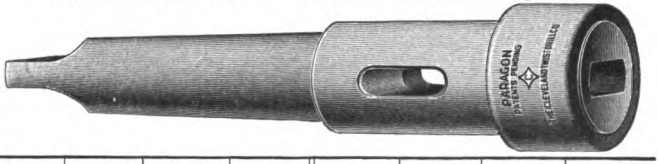
Patented March, 1901 For Code Words See Page 238



Size Hole No.	Price Each	Holds Drills Inches Inclusive	Length Over All Inches	Diameter of Shank Inches
1	$1 20	3/8 to 17/32	6 1/2	1 1/8
2	1.80	35/64 " 7/8	7	1 1/4
3	2.50	57/64 " 1 1/8	9	1 1/2
4	4.00	1 9/64 " 1 13/32	10 7/8	2

No. 903—"Paragon" Fitted Socket

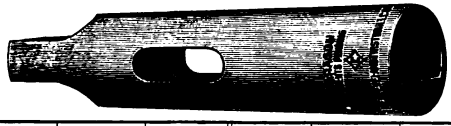
Patented March, 1901 For Code Words See Page 238



Size No.	Inside Taper No.	Taper Shank No.	Price Each	Size No.	Inside Taper No.	Taper Shank No.	Price Each
1 to 1	1	1	$2.00	3 to 2	3	2	$3.20
1 " 2	1	2	2.00	3 " 3	3	3	3.20
1 " 3	1	3	2.50	3 " 4	3	4	3.20
1 " 4	1	4	3.20	3 " 5	3	5	4.80
1 " 5	1	5	4.80	4 " 2	4	2	4.80
2 " 2	2	2	2.50	4 " 3	4	3	4.80
2 " 3	2	3	2.50	4 " 4	4	4	4.80
2 " 4	2	4	3.20	4 " 5	4	5	4.80
2 " 5	2	5	4 80	4 " 6	4	6	12.00

No. 907—"Paragon" Sleeve

Patented March, 1901 For Code Words See Page 238

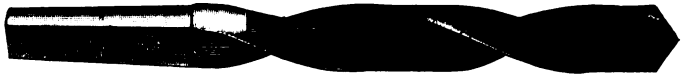


Size No.	Inside Taper No.	Outside Taper No.	Price Each	Size No.	Inside Taper No.	Outside Taper No.	Price Each
1 to 2	1	2	$1.80	2 to 5	2	5	$4.40
1 " 3	1	3	2.40	3 " 3	3	3	3.00
1 " 4	1	4	3.00	3 " 4	3	4	3.00
1 " 5	1	5	4.40	3 " 5	3	5	4.40
2 " 2	2	2	2.40	4 " 4	4	4	4.40
2 " 3	2	3	2.40	4 " 5	4	5	4.40
2 " 4	2	4	3.00	4 " 6	4	6	10.00

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 930 "Paragon" High Speed Drills

Code Word—LOWLAND



FOR DRIVING SOCKET SEE PAGES 84 AND 85

Diameter Inches	Price Each	Length Over All Inches	Flat Taper Shank
3/8	$1.05	5 5/8	
13/32	1.10	6	
7/16	1.15	6 1/4	No. 1
15/32	1.20	6 1/2	
1/2	1.30	6 3/4	
17/32	1.40	7	
9/16	1.50	7 3/4	
19/32	1.60	7 3/4	
5/8	1.75	7 7/8	
21/32	1.90	7 7/8	
11/16	2.05	8 1/4	
23/32	2.25	8 1/4	No. 2
3/4	2.40	8 3/4	
25/32	2.60	8 3/4	
13/16	2.80	9	
27/32	3.00	9	
7/8	3.20	9 1/8	
29/32	3.45	9 7/8	
15/16	3.75	10 1/8	
31/32	4.05	10 1/8	
1	4.35	10 1/2	No. 3
1 1/32	4.75	10 1/2	
1 1/16	5.10	11	
1 3/32	5.45	11	
1 1/8	5.80	11 1/2	

Diameter Inches	Price Each	Length Over All Inches	Flat Taper Shank
1 5/32	$6.20	11 3/4	
1 3/16	6.55	12	
1 7/32	6.90	12	
1 1/4	7.20	12 1/2	
1 9/32	7.60	12 1/2	
1 5/16	8.00	13 1/4	No. 4
1 11/32	8.40	13 1/4	
1 3/8	8.80	13 3/8	
1 13/32	9.20	13 3/8	
1 7/16	9.60	13 3/4	
1 15/32	10.00	13 3/4	
1 1/2	10.40	16 3/4	
1 17/32	10.80	17	
1 9/16	11.20	17	
1 19/32	11.65	17	
1 5/8	12.10	17	
1 21/32	12.60	17	
1 11/16	13.05	17 1/8	
1 23/32	13.60	17 1/8	No. 5
1 3/4	14.10	17 3/8	
1 25/32	14.55	17 3/8	
1 13/16	15.00	17 5/8	
1 27/32	15.50	17 5/8	
1 7/8	16.00	17 7/8	
1 29/32	16.55	17 7/8	
1 15/16	17.10	18 1/8	

Continued on next page

64th sizes will be furnished at price of next larger size listed.

Special attention is called to the extra large size taper shanks regularly put on "Paragon" Drills, the sizes of "Paragon" taper shanks corresponding to the sizes of regular taper shanks having the same number.

No. 5 and No. 6 "Paragon" Shanks are full Morse taper length and should be used in the Collets shown on page 84. The other "Paragon" Shanks are shorter and fit "Paragon" Sockets and Sleeves.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 930 "Paragon" High Speed Drills

(Continued)

Code Word—LOWLAND

FOR DRIVING SOCKET SEE PAGE 84

Diameter Inches	Price Each	Length Over All Inches	Flat Taper Shank	Diameter Inches	Price Each	Length Over All Inches	Flat Taper Shank
1 31/32	$17.65	18 1/8		2 5/8	$32.00	22 7/8	
2	18.20	18 1/8		2 21/32	33.00	23 3/8	
2 1/32	18.85	18 1/8		2 11/16	34.00	23 3/8	
2 1/16	19.50	18 1/4		2 23/32	35.00	23 7/8	
2 3/32	20.15	18 1/4		2 3/4	36.00	23 7/8	
2 1/8	20.80	18 1/4		2 25/32	37.00	23 7/8	
2 5/32	21.50	18 1/4		2 13/16	38.00	23 7/8	
2 3/16	22.20	18 3/8		2 27/32	39.00	24 5/8	
2 7/32	22.90	18 3/8	No. 5	2 7/8	40.00	24 5/8	
2 1/4	23.60	18 3/8		2 29/32	41.25	24 5/8	
2 9/32	24.30	18 3/8		2 15/16	42.50	24 5/8	No. 6
2 5/16	25.00	18 3/8		2 31/32	43.75	24 5/8	
2 11/32	25.70	18 3/4		3	45.00	24 5/8	
2 3/8	26.40	18 3/4		3 1/16	48.00	24 5/8	
2 13/32	27.10	19 1/4		3 1/8	51.00	24 5/8	
2 7/16	27.80	19 1/4		3 3/16	54.50	24 5/8	
2 15/32	28.50	19 3/4		3 1/4	58.00	24 5/8	
2 1/2	29.20	19 3/4		3 5/16	61.75	24 5/8	
2 17/32	29.90	22 3/8		3 3/8	65.50	24 5/8	
2 9/16	30.60	22 3/8	No. 6	3 7/16	69.50	24 5/8	
2 19/32	31.30	22 5/8		3 1/2	73.50	24 5/8	

Drills 2 1/4 inches and larger will be furnished with No. 6 Shanks without extra charge. Unless No. 6 Shank is specified, drills from 2 1/4 inch to 2 1/2 inch, inclusive, will be furnished with No. 5 Shank.

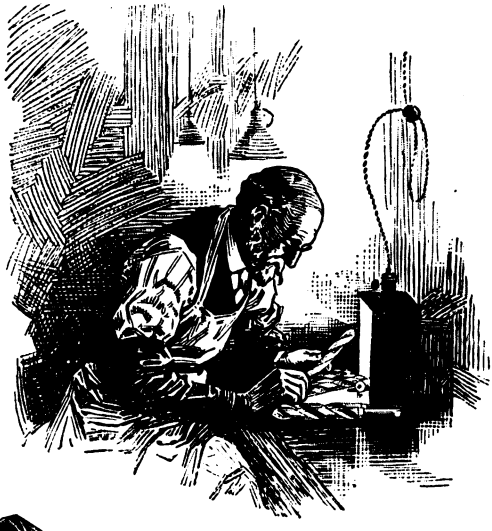
No. 5 and No. 6 "Paragon" Shanks are full Morse taper length and should be used in the Collets shown on page 84.

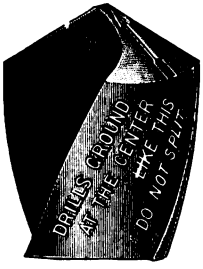
For dimensions of "Paragon" Shanks see page 83.

THROUGH 57 1/2 INCHES OF CAST IRON PER MINUTE—PAGE 82

HELPS AND HINTS
COUNTER SINKS
REAMERS
"PARADO REAMER
"PEERLESS REAMERS
MISCEL LANEOU
COD

Drilling Helps and Hints



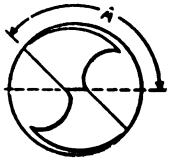


No. 190—Model Drill Point

Code Word—1 .NDTALLY

The Model Drill Point will be found especially valuable in teaching inexperienced persons to grind drills properly, so as to do more and better work and keep the number of broken drills down to a minimum.

The line across the center of the drill point, formed by the intersection of the clearance, and known as the "dead center," should never be less than 120° and may be as much as 135°. (See attached diagram and angle A—also the article on Drill Grinding, page 89.) It is of the utmost importance that this angle should be correct, as in an experience of over forty years we have found that ninety-nine out of every hundred split drills show improper grinding at this point.



Price of Drill Point $1.00

Drilling Helps and Hints

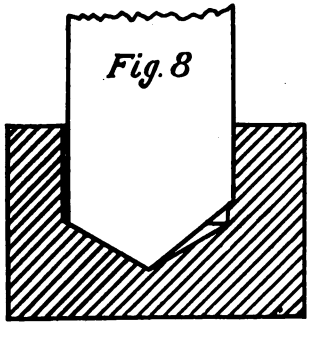
IT IS our aim in these few pages to present to our friends a brief but comprehensive collection of ideas, based on our own practice and observation in the use of twist drills, to assist them in obtaining increased cutting capacity, maximum durability and general satisfactory performance.

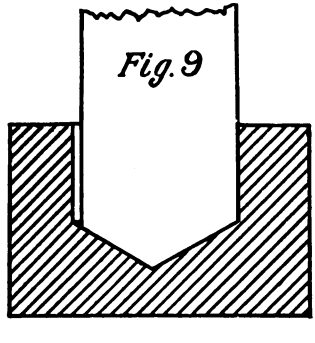
Point Grinding

To get the maximum efficiency and full life of a properly made and tempered drill the first requisite is that it be properly ground at the point. This means that both cutting edges must (1st) have the same inclination to the axis of the drill—59° is recommended as the best angle for ordinary purposes—and (2nd) be of exactly the same length; this will of course bring the center of the cutting edges, or point, in the true center of the drill and cause it to produce a round or smooth hole.

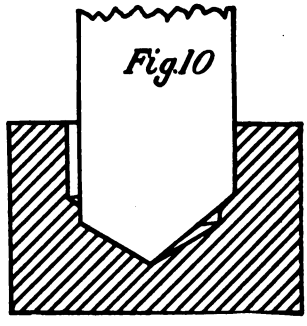
Cutting Edges Must be at Equal Angles and of Equal Length

To get maximum results, both these requirements must be carefully observed. If the point be central but the angles of the cutting edges different, the drill will bind on the side of the hole opposite to that side of the point which is cutting, will drill too large a hole, and all the work will





fall on the one cutting edge. Fig. 8 illustrates this, while Fig. 9 shows a point ground with equal angles but with the cutting edges of different lengths, which will result in the hole being too large.



When both angle and length of cutting edges are wrong the drill will be laboring under the severe conditions shown in Fig. 10, and the support which the drill should receive from the metal on which it is operating will be seriously impaired.

Theory of Lip Clearance

Another very important thing to be considered in drill grinding is the lip clearance, or proper contour of the point back of the cutting edge. To get this correct, even on a machine, is a difficult problem. We are indebted to the Worcester Polytechnic Institute for their permission to reprint the following technical analysis of the theory of lip clearance on a twist drill:

"Every portion of a drill lip when at work travels in a helix of its own. No two of these helices are of the same diameter, yet all have the same pitch because all parts of the drill advance equally.

"The 'Clearance' at any given point in the cutting lip is determined by, and bears a constant relation to, the tangent, at that particular point, of its own individual helix.

"Therefore near the point of the drill where the helices are of smaller diameter (their pitch remaining the same), these tangents form more acute angles with the axis of the drill than where the diameters are large, as near the outer corner of the lip. The Clearance being governed by these angles must likewise be steeper near the point of the drill than it is farther out on the lip. (See paragraph on 'Angle of Lip Clearance,' page 93.)

"In order to grade the clearance properly along the drill lip as above outlined from point to periphery, and curve the back side of the cutting edge so that maximum endurance and strength, consistent with free cutting, are preserved at all points *it is necessary that every portion of the cutting lip should, while*

being ground, rock against the grinding wheel in a path very similar to that in which it travels when at work.

"If while at work those portions of the drill lip near the point travel in shorter paths and smaller circles than portions nearer the outer corner of the lip, then this condition should exist when the drill is being ground."

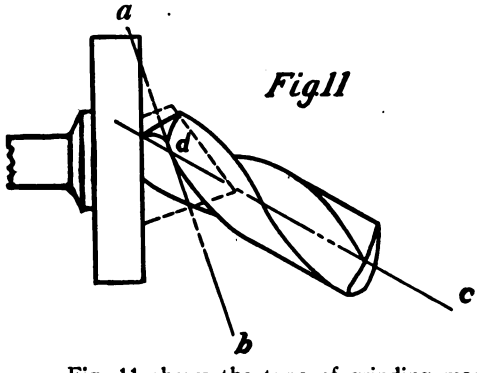


Fig11

Correct Form of Point and the Grinding Machine

Fig. 11 shows the type of grinding machine that gives the form of drill point just described and which we have adopted as a result of our experiments. This form is a segment of a cone, the axis of which is on the line a-b at the angle b d c to the axis of the drill. The dotted lines show the complete frustum of the cone, in the position which our experiments showed to be about right for the best all around results.

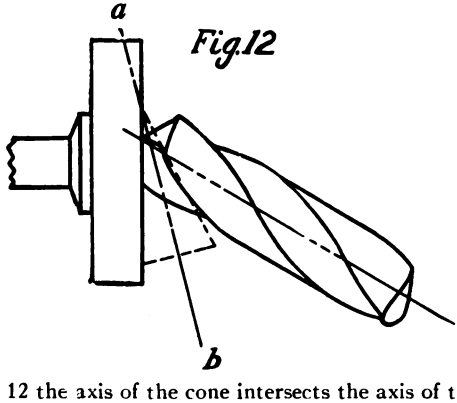


Fig.12

In Fig. 12 the axis of the cone intersects the axis of the drill too near the drill point. The curvature near the center of the drill is

therefore too quick, and we found that a drill ground in this manner consumed about 20% more power than the same drill ground as illustrated in Fig. 11.

Fig. 13

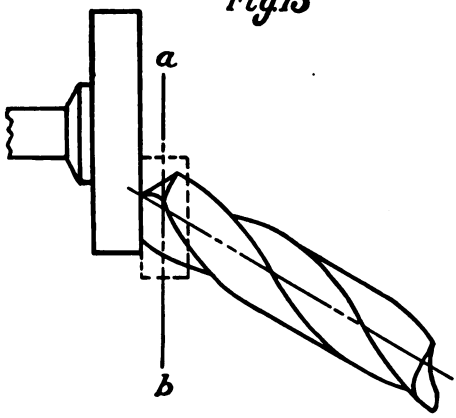


Fig. 14

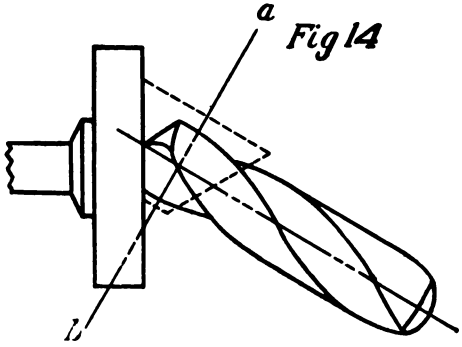


Fig. 13 illustrates the point whose surface is a segment of a cylinder, and Fig. 14 represents the inverted cone with axis on line a-b, dotted lines show the frustum complete. In both these forms of point (Figs. 13 and 14), the radius of curvature is too small at the outside, or periphery, compared with that at the inside, or center.

A Cause of Chipped Cutting Edges

As a result, when the contour of the point at the periphery is approximately correct it will be too flat at the center, and unless the angle of lip clearance (see next paragraph) is greatly increased, the heel near the center will drag. If the angle is increased to correct this fault the cutting edge near the center will be so fine

(i. e., have so little backing), as to endanger its chipping out—frequently causing the drill to break.

Angle of Lip Clearance Another important thing to be considered in grinding drill points is the *angle* of lip clearance. The angle of lip clearance must not be confused with the shape of the point, just dealt with. Our experience shows that 12° is the best angle at the periphery for a drill ground as in Fig. 11, and this should be increased gradually, as the center of the drill is approached (see "Theory of Lip Clearance," page 90), until the line across the center of the web stands at an angle with the cutting edges of never less than 120° and it may be as much as 135°—as shown in Fig. 15. For heavier feeds in soft material the angle of lip

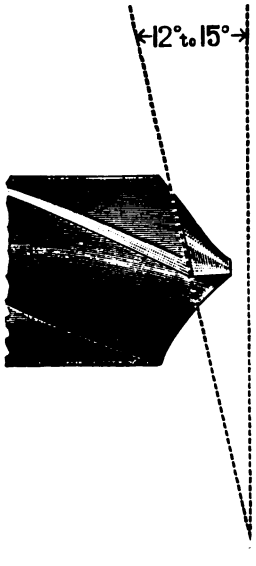
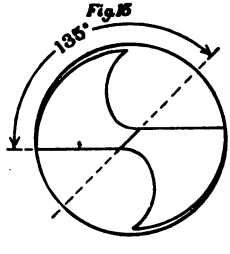


Fig. 15



clearance may be safely increased to 15° at the periphery, but care should be taken that the angle at the center is given a corresponding increase. That machines grinding the form of point illustrated in Fig. 11 (see paragraph on "Correct Form of Point," page 91) automatically take care of this increase, when properly adjusted, is one of their strong recommendations. The failure to give sufficient angle of lip clearance at the center of the drill is the *principal cause of splitting drills up the web.*

Drilling Speeds and Feeds

Speeds of Twist Drills The subject of the speed at which a drill should run and the feed per revolution is one on which opinions differ and the extremes of heavy feed with slow speed, and light feed with fast speed are both supported by reliable data. No rule can be given to cover all cases, and the ordinary tables published (see page 101) should be considered as guides only; the correct speeds should be determined by good, sound judgment for each particular case.

Start at Moderate Speed and Feed If no table is at hand and the operator is in doubt as to the correct speed for a twist drill, it is a safe rule to start carbon steel drills with a peripheral speed of 30 feet per minute for soft tool and machinery steel, 35 feet for cast iron, 60 feet for brass, and a feed of from .004 to .007 of an inch per revolution for drills ½ inch and smaller, and from .005 to .015 inch per revolution for drills larger than ½ inch. At these speeds and feeds a good cutting-compound (see page 96) is recommended.

Speed and Feed for High Speed Drills In the case of high speed drills the above feeds should remain unchanged, but the speeds should be increased to from two to two and one-half times. With these speeds and feeds as a starting point, maximum results should be obtained by noting the condition of the drill in connection with the suggestions in the following paragraphs.

Indications of Too Much Feed If the drill chips out at the cutting edge there is too much feed or the drill has been ground with too much lip clearance (see top of page 93). A drill split up the web is evidence of too much feed or of improper grinding (see bottom of page 93), and no drill manufacturer ought to be expected to replace a split drill unless a flaw is evident in the break. *The failure to give sufficient lip clearance at the center of a drill will almost always cause it to split up the web.*

Indications of Too Much Speed When the extreme outer corners of the cutting edges wear away too rapidly, it is evidence of too much speed.

Best Performance The best performance of a drill will be obtained when the effect of the work on the tool is somewhere between these two extremes.

In General High Speed and Light Feed Recommended The remedy for drills that are *properly ground* chipping at the cutting edges is to decrease the feed and increase the speed. If a little care is taken to adjust these properly the drill will do as much work as before and have much longer life. Although we have seen 50 point carbon steel drilled with one of

our two inch carbon drills at a periphery speed of 60 feet per minute and a feed of .065 inch per revolution, we do not think this is good practice as we have found in our own work that the majority of cases are better suited to high speed and light feed carried to the point at which the outside corners commence to wear away.

Importance of Speed in Drilling Small Holes

If the correct speed is not obtained in drilling small holes with hand feed the risk of breaking the drills is greatly increased, especially at the moment the point of the drill is breaking through the farther side of the work. This is due to the operator's difficulty in pressing lightly enough on the feeding lever not to give excessive feed to the slow running drills. In English textile shops specializing in the manufacture of wool combs and kindred products thousands of holes as small as .013 inch in diameter (about No. 80 drill) are drilled every day through brass plates $\frac{7}{16}$ inch thick. A No. 59 drill is run at about 20,000 RPM, and this is increased to nearly 30,000 when drilling holes as small as .013 inch. Care is taken to see that the point of the drill runs perfectly true, and it is kept sharp by occasionally rubbing on a smooth oil stone. Outside this industry it is a rare occurrence to come across a small drilling machine running at more than a quarter of its proper speed.

Drilling With Automatic Machines Under Flood of Lard Oil

For automatic machines where holes do not exceed two diameters of the drill in depth, and under a flood of lard oil, high speeds and light feeds are especially recommended. For holes deeper than this it becomes a matter of getting rid of the chips, and slower speeds with heavier feeds should be used as the bottom of the hole is approached. Always endeavor in automatic drilling to grind a drill so as to get a small compact roll to the chip, and if possible keep it intact the entire depth of the hole.

Speed and Feed Must be Adjusted to Hardness of the Material

Variations in the hardness of the material drilled should of course be met by the skilled operator with changes in the speed and feed. This is necessary as the commercial twist drill must be tempered for average conditions, so as to give good results in either hard or soft material. A drill that would give maximum results drilling hard steel would be entirely too brittle to work well in softer and tougher material.

Drilling Cast Iron High speeds in cast iron tend to wear away the small portion of the drill that represents the full diameter, called "land" or "margin," and we think that 35 feet per minute peripheral speed should not be exceeded for carbon drills. Feed may be from .007 inch to .015 inch per revolution, according to the quality of metal drilled.

Drilling Brass A heavier feed should be used in drilling brass, especially in automatic machines, to insure chips working out, and if lubricated at all the tool should be flooded with paraffine oil.

Cutting Compounds for Various Metals To maintain the speeds and feeds recommended on page 94 it will be found necessary to use some good cutting compound, and we recommend the following in the order named.

For hard and refractory steel—Turpentine, kerosene, soda water.

For soft steel and wrought iron—Lard oil, soda water.

For malleable iron—Soda water.

For brass—A flood of paraffine oil, if any.

For aluminum and soft alloys—Kerosene, soda water.

Cast iron—Should be worked dry or with a jet of compressed air for a cooling medium.

Warm High Speed Drills Before Using The above recommendations apply equally well to carbon or high speed drills, but it is very good practice to warm the lubricant before using it with high speed tools. Any hard piece of steel is extremely brittle when cold, and high speed drills should never be put to work in that condition; they work much better when warm, often giving good results when the chips are turned blue by the heat generated. Nothing will "check" a high speed drill quicker than to turn a stream of cold water on it after it has become heated working in a hole. It is equally bad to plunge it in cold water after the point has been heated in grinding. Either of these practices is certain to impair the strength of the drill by starting a number of small checks in it.

Filing Not Reliable Test of Cutting Ability A fact often lost sight of, even by experienced users of drills, is that cutting ability and hardness are not the same thing. This is especially true of high speed drills, the apparent hardness of which varies with the composition of the steel and is no indication of the cutting ability. Some of the best high speed tools we have ever tested could be filed so readily that if this were any

indication of the work to be expected of them they would be condemned without a working trial. A high speed drill that cannot be filed may, by exercising the greatest care, be made to drill extremely hard material successfully; but for softer materials, or where a large amount of work must be done in a given time, it will be found so brittle as to be worthless. Numerous tests have proven that the hardness of files varies quite as much as that of other hardened tools, and this is another reason why file tests are unreliable. No drill that files hard or soft should be condemned for that reason alone, but should first be given a drilling test in material of known hardness.

Breakage of Drills Often Due to Back Lash in Drill Spindle

Drills that are properly hardened and pointed and run at moderate speeds and feeds are often condemned on account of breakage when the trouble rightly should be charged to the drilling machine. If there is any spring between the upper part of the machine and the table, the drill will not begin to cut until the feed-pressure has taken this up, after which the feed will be practically constant until the point of the drill breaks through. As this happens, the resistance to the penetration of the drill is abruptly reduced, and any spring, in the parts of the machine, will cause the drill to "hog in." The sudden increase in torsional strain, which is thus produced, frequently causes drills to break.

There is another way in which spring between the parts of the machine sometimes breaks drills. Any movement of the table with reference to the upper part of the machine throws the spindle out of alignment with the hole that is being drilled, tending to bend or cramp the drill. Then if the hole is of any depth the drill is almost sure to go, regardless of its temper or the condition of its cutting edges.

The Function of a Tang

There seems to exist some misunderstanding respecting the function of the tang on a taper shank tool: the tang exists merely to *assist* the taper shank in driving the tool. It is not designed to withstand the entire driving strain.

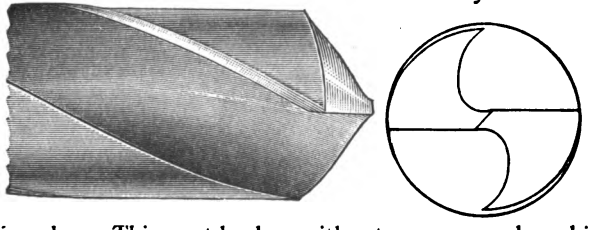
Under ideal conditions no tang would be necessary, as a perfect fit between the taper shank and the hole in the spindle would, in itself, give a sufficient drive. However, this fit, in actual practice, is seldom perfect, especially after the parts have undergone any amount of wear, and the tang is a most useful, if not a necessary, auxiliary. When the parts are badly worn, or proper care has not been taken to keep the taper surfaces free from grit, the driving function of the taper fit is lost and an undue strain is thrown upon

the tang. Under such conditions is it any wonder that, nine times out of ten, the tang proves unequal to this additional burden and is twisted off?

If, however, the taper surfaces are kept clean and the driving parts in perfect condition, the tang will be required to perform only its legitimate function and the greater part of the trouble experienced from broken and twisted tangs will be eliminated.

Drilling Hard Material The drilling of hard material is facilitated by using turpentine as a cutting compound, and by grinding off the sharp angles of the cutting edges, as shown in Fig. 16, so as to permit the use of heavy feeds without chipping the

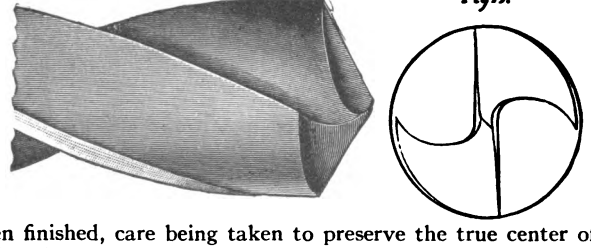
Fig 16.



cutting edges. This must be done with extreme care and good judgment, however, or the drill will be unfitted for further use. This form of point will also be found efficient in drilling soft material, like brass, where the regular point has a tendency to "hog in" or "grab."

Thinning the Point to Make Drills Feed Easier Drills are made to feed to their work easier by thinning the extreme point. This is a delicate operation and requires some skill on the operator's part, but is a decided improvement in hand feed drilling, or when using high speed flat, or flat-twisted drills with heavy webs. To thin the point properly a round face emery wheel is necessary, and the drill should look like Fig. 17

Fig 17.



when finished, care being taken to preserve the true center of the drill and not weaken the web too much by extending the ground portion too far up the flutes.

Importance of Proper Working Conditions

The surprising results that can be obtained with properly made twist drills when skilfully handled and working under *proper conditions*, are well illustrated by the remarkable records made in a public test at Atlantic City, N. J., in June, 1911. During the annual Convention of Railway Master Mechanics we had a heavy, high-duty drill press in operation in connection with our exhibit, and the results obtained from CLEVELAND milled and "flatwist" high speed drills taken from stock are tabulated herewith:

RECORDS OF CLEVELAND HIGH SPEED DRILLS

Sizes and Kind of Drill	Material	R. P. M.	Feed per Rev.	Inches Drilled per Min.	Rev., Speed in Feet per Min.	Cu. Ins. Metal Removed per Min.
1¼" paragon	Cast Iron 3½" thick	500	0.050	25	163.6	30.68
1¼" paragon		325	0.100	32½	106	39.88
1¼" paragon		475	0.100	47½	155	58.29
1¼" paragon		575	0.100	57½	188	70.56
1½" paragon		300	0.030	9	117	15.90
1½" paragon		325	0.100	32½	127.6	57.43
1½" paragon		335	0.100	33½	131.5	59.19
1½" paragon		355	0.100	35½	139.4	62.73
1¾" paragon		235	0.100	23½	107.6	56.52
1¾" paragon		350	0.100	35	160	84.19
2 1/16" paragon		190	0.050	9½	115	39.90
3" paragon		120	0.100	12	94	84.82
1¼" paragon	Machinery Steel 4¼" thick	350	0.030	10½	113.7	12.88
1⅝" paragon		225	0.040	9	94.8	18.66
2 1/16" paragon		165	0.020	3¼	100	13.86
2 1/16" paragon		200	0.020	4	121	16.80
2½" milled		150	0.015	2¼	98	11.04
2½" milled		150	0.040	6	98	29.45
2½" milled		175	0.040	7	114.5	34.36
1¾" paragon		275	0.030	8¼	125	19.84
3" paragon		150	0.030	4½	117.8	31.81
3¼" paragon		150	0.030	4½	127	37.33

Tests with a Two-Fold Object

The object of these tests was two-fold: 1st, to demonstrate what is good shop practice the drills were put through at speeds and feeds considered economical under average shop conditions; 2nd, to demonstrate the reserve efficiency and durability of the drills—"stunts" which demanded extremely high rates of speed and feed were attempted.

Good Shop Practice

In the test under average conditions a 2½ inch high speed CLEVELAND milled drill drilled sixty-eight holes through a billet of machinery steel 4¼ inches thick without being reground. The drill was operated at 150 revolutions per minute with a feed of .015 inches per revolution and removed a total of 1418 cubic inches of metal. Although the drill was still in good condition the test was here cut short by the con-

vention coming to a close. It had demonstrated, however, what can be accomplished all day long in any shop properly equipped.

The Highest Drilling Speed on Record In pursuing the second object of the tests, the highest drilling speed known to machine shop practice was attained by a stock 1¼-inch "Paragon" flatwist high speed drill in successfully removing 70.56 cubic inches of cast iron in one minute, drilling repeatedly through a heavy billet at the remarkable rate of penetration of 57½ *inches—almost five feet—per minute.* (By referring to the diagram it will be seen that two drills actually removed more metal in the same time, but this is accounted for by the large diameters of the drills and cannot be compared with the above.) The record drill ran at 575 revolutions per minute with *one-tenth* inch feed per revolution, and successfully withstood the strain of this extreme speed and feed. Before attaining the maximum performance other stock drills were put through at the rates of 25, 32½, 33½, 35 and 47½ inches per minute, as can be seen from the tabulated record of the tests. In no case was the limit of strength of the drills reached, but the penetration speed of 57½ inches per minute could not be exceeded on account of the inadequate capacity of the electric feed wires to the motor driving the drill press.

Ideal Conditions Responsible Drilling at such high speeds and heavy feeds is, of course, not to be recommended as economical shop practice, and this performance will not, in all probability, be repeated in many shops. The point we wish to make, however, is, that these results were made possible by such carefully established ideal conditions as: absolute rigidity in the machine, solid clamping of the work, perfect grinding of the tool, and expert handling.

Key to Table of Cutting Speeds The Table of Cutting Speeds shown on following page, should be used only as a guide and the correct speeds for drills should be determined by good judgment applied to each individual case. It is safe to start carbon drills with a peripheral speed of 30 feet per minute for soft tool and machinery steel, 35 feet for cast iron and 60 feet for brass, using in all cases a feed of from .004 to .007 inch per revolution for drills ½-inch and smaller, and from .005 to .015 inch per revolution for drills larger than ½-inch in diameter. At these speeds a suitable cutting compound should be used for wrought iron and steel.

In the case of High Speed Steel Drills the above feeds should remain unchanged, but the speeds should be increased from two to two and one-half times.

All of the speeds recommended are only speeds at which the drilling should be started. They are approximate for average conditions only. They can be greatly exceeded under some conditions, but under others they will have to be reduced. *In all cases* the operator should be guided by observing the condition of the drill in connection with the suggestions on pages 94 to 96.

TABLE OF CUTTING SPEEDS

Feet per Min.	30′	40′	50′	60′	70′	80′	90′	100′	110′	120′	130′	140′	150′
Diameter Inches	Revolutions per Minute												
1/16	1833	2445	3056	3667	4278	4889	5500	6111	....	....	....	....	....
1/8	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
3/16	611	815	1019	1222	1426	1630	1833	2037	2241	2445	2648	2852	3056
1/4	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	306	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	229	306	382	458	535	611	688	764	840	917	993	1070	1146
9/16	183	244	306	367	428	489	550	611	672	733	794	856	917
3/4	153	203	255	306	357	407	458	509	560	611	662	713	764
7/8	131	175	218	262	306	349	393	436	480	524	568	611	655
1	115	153	191	229	267	306	344	382	420	458	497	535	573
1 1/8	102	136	170	204	238	272	306	340	373	407	441	475	509
1 1/4	92	122	153	183	214	244	275	306	336	367	397	428	458
1 3/8	83	111	139	167	194	222	250	278	306	333	361	389	417
1 1/2	76	102	127	153	178	204	229	255	280	306	331	357	382
1 5/8	70	94	117	141	165	188	212	235	259	282	306	329	353
1 3/4	65	87	109	131	153	175	196	218	240	262	284	306	327
1 7/8	61	81	102	122	143	163	183	204	224	244	265	285	306
2	57	76	95	115	134	153	172	191	210	229	248	267	287
2 1/4	51	68	85	102	119	136	153	170	187	204	221	238	255
2 1/2	46	61	76	92	107	122	137	153	168	183	199	214	229
2 3/4	42	56	69	83	97	111	125	139	153	167	181	194	208
3	38	51	64	76	89	102	115	127	140	153	166	178	191

Drills and Countersinks Combined

No. 19 Set

Code Word—PARLAND

Carbon Steel No. 98

Code Word—LABATE

High Speed Steel No. 498

Code Word—LIVER

The included angle of the Countersink is 60°. The drills at both ends are of the same diameter. Special sizes or angles made to order.

Size	Price per Dozen		Diam. of Body Inches	Diam. of Drills Inches
	Carbon Steel	High Speed Steel		
A1	$2.00	$6.00	1/8	No. 57
C1	2.25	6.00	13/64	No. 55
C2	2.25	6.00	13/64	1/16
D1	2.50	6.00	15/64	No. 49
D2	2.50	6.00	15/64	No. 45
E1	2.75	6.00	.302	5/32
E2	2.75	6.00	.302	1/8
F1	3.50	9.00	7/16	5/32
F2	3.50	9.00	7/16	3/16

Set No. 19 is composed of Drills and Countersinks List No. 98, sizes A1, C2, D1, D2, E1, E2, F1, F2. This range of sizes will be found ample to cover the center hole requirements of almost every shop. The set is packed in a neat wooden box with an individual hole for each tool to avoid misplacement and to permit quick selection.

Price complete..... $2.25

Carbon Steel No. 98-A

Code Word—LABATER

High Speed Steel No. 498-A

Code Word—LIVERY

Bodies 1/2 inch or .648 inch (5/8 inch) diameter flatted

Size	Price per Dozen		Diam. of Body Inches	Diam. of Drills Inches	Size	Price per Dozen		Diam. of Body Inches	Diam. of Drills Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
J1	$4.60	$12.00	1/2	7/32	J4	$5.00	$12.00	1/2	13/32
J2	4.60	12.00	1/2	9/32	M1	7.25	18.00	5/8	7/32
J3	5.00	12.00	1/2	11/32	M2	7.25	18.00	5/8	9/32

These drills and countersinks are specially designed for drilling and countersinking tires and wagon irons at one operation. They are made of highest grade tool steel specially tempered.

WHEN A CAP SCREW SNAPS SEE PAGE 174

Machine Countersinks

No. 115A

Code Word—LACTOR

Shank ½ in. diameter x 2¼ in. long

Diameter Inches	Price per Dozen
⅝	$9.35
¾	12.25
⅞	14.00
1	15.75

No. 115B

Code Word—LACTORISM

Shank .648 in. diameter x 2¼ in. long

Diameter Inches	Price per Dozen
⅝	$9.35
¾	12.25
⅞	14.00
1	15.75

The included angle at point is 60°. Will furnish 80° angle when specified. Unless otherwise specified will always furnish ½ inch diameter shanks.

No. 115—Bit Stock Countersinks

Code Word—LACTOME

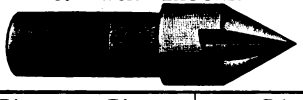
Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches
⅜	$0.50	4¼	¾	$0.90	5
½	.60	4¼	⅞	1.05	5
⅝	.75	4¼	1	1.20	5

The included angle at point is 82°. Special angles to order.

Center Reamers

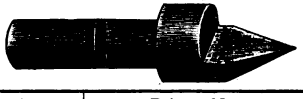
No. 125A—No. 1

Code Word—LAGGARD



No. 125A—No. 2

Code Word—LAGGINGLY



Diameter Shank Inches		Diameter Body Inches	Price—No. 1		Price—No. 2	
			Dozen	Each	Dozen	Each
3/16	x	¼	$3.60	$0.30	$3.00	$0.25
¼	x	⅜	4.20	.35	3.60	.30
⅜	x	½	4.80	.40	4.20	.35
½	x	⅝	7.80	.65	7.20	.60
½	x	¾	10.20	.85	9.60	.80

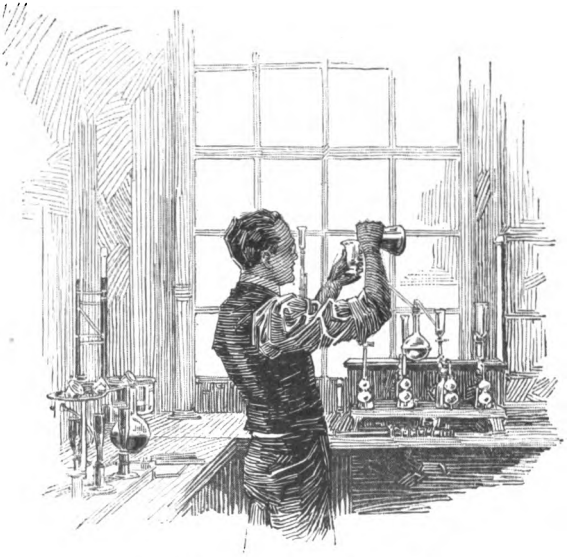
Special sizes made to order. The included angle is 60° unless otherwise ordered. Center Reamers with 72° or 82° included angle will be furnished at regular price. In ordering, give diameter of both shank and body.

WHEN A STUD SNAPS SEE PAGE 174

"Cleveland" Reamers

Carbon and High Speed

Detailed Index—Pages 4 to 17



All steel is subjected to a critical chemical and physical examination to insure its fitness for "Cleveland" tools.

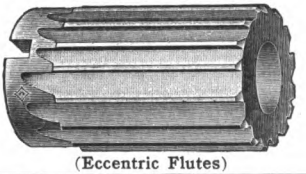
Fluted Shell Reamers

Carbon Steel No. 130A

Code Word—LAMECH

High Speed Steel No. 620

Code Word—LOWER



(Eccentric Flutes)

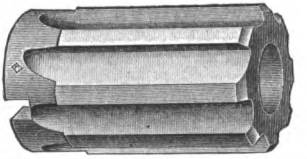
Rose Shell Reamers

Carbon Steel No. 130B

Code Word—LAMED

High Speed Steel No. 622

Code Word—LOWERING



Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
1/2	$1.70	$3.25	1/4	2	
17/32	1.80	3.40	1/4	2	
9/16	1.80	3.40	1/4	2	No. 3
19/32	1.90	3.55	1/4	2	
5/8	1.90	3.55	1/4	2	
21/32	2.00	3.70	3/8	2 1/4	
11/16	2.00	3.70	3/8	2 1/4	
23/32	2.10	3.85	3/8	2 1/4	No. 4
3/4	2.10	3.85	3/8	2 1/4	
25/32	2.20	4.00	1/2	2 1/2	
13/16	2.20	4.00	1/2	2 1/2	
27/32	2.30	4.25	1/2	2 1/2	
7/8	2.30	4.25	1/2	2 1/2	
29/32	2.40	4.50	1/2	2 1/2	No. 5
15/16	2.40	4.50	1/2	2 1/2	
31/32	2.50	4.75	1/2	2 1/2	
1	2.50	4.75	1/2	2 1/2	
1 1/32	2.70	5.00	5/8	2 3/4	
1 1/16	2.70	5.00	5/8	2 3/4	
1 3/32	2.90	5.25	5/8	2 3/4	
1 1/8	2.90	5.25	5/8	2 3/4	No. 6
1 5/32	3.10	5.50	5/8	2 3/4	
1 3/16	3.10	5.50	5/8	2 3/4	
1 7/32	3.30	5.75	5/8	2 3/4	
1 1/4	3.30	5.75	5/8	2 3/4	
1 9/32	3.55	6.00	3/4	3	
1 5/16	3.55	6.00	3/4	3	No. 7

Continued on next page

Shell Reamers have taper holes, the diameter given being at the large end. For Shell Reamer Arbors, see pages 111, 112, 180.

High Speed Reamers No. 620 are not carried in stock regularly in sizes 7/8 inch and larger. We recommend "Peerless" High Speed Reamers Nos. 519 and 520 on pages 167, 170, 171.

All sizes and dimensions not listed are special and subject to special prices. Reamers for brass or bronze require special clearance and are so furnished on request.

"PEERLESS" REAMERS REDUCE REAMING COSTS

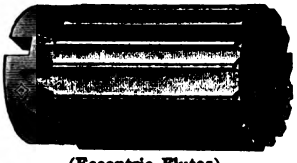
Fluted Shell Reamers

Carbon Steel No. 130A

Code Word—LAMECH

High Speed Steel No. 620

Code Word—LOWER



(Eccentric Flutes)

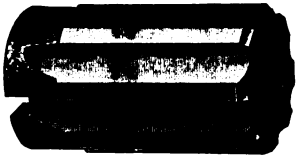
Rose Shell Reamers

Carbon Steel No. 130B

Code Word—LAMED

High Speed Steel No. 622

Code Word—LOWERING



Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
1 11/32	$3.80	$6.50	3/4	3	
1 3/8	3.80	6.50	3/4	3	
1 13/32	4.05	7.00	3/4	3	
1 7/16	4.05	7.00	3/4	3	
1 15/32	4.30	7.50	3/4	3	
1 1/2	4.30	7.50	3/4	3	No. 7
1 17/32	4.55	8.25	3/4	3	
1 9/16	4.55	8.25	3/4	3	
1 19/32	4.80	9.00	3/4	3	
1 5/8	4.80	9.00	3/4	3	
1 21/32	5.10	9.75	1	3 1/2	
1 11/16	5.10	9.75	1	3 1/2	
1 23/32	5.40	10.50	1	3 1/2	
1 3/4	5.40	10.50	1	3 1/2	
1 25/32	5.70	11.25	1	3 1/2	
1 13/16	5.70	11.25	1	3 1/2	No. 8
1 27/32	6.00	12.00	1	3 1/2	
1 7/8	6.00	12.00	1	3 1/2	
1 29/32	6.30	12.75	1	3 1/2	
1 15/16	6.30	12.75	1	3 1/2	
1 31/32	6.60	13.50	1	3 1/2	
2	6.60	13.50	1	3 1/2	
2 1/16	6.95	14.25	1 1/4	3 3/4	
2 1/8	7.30	15.00	1 1/4	3 3/4	
2 3/16	7.65	15.75	1 1/4	3 3/4	
2 1/4	8.00	16.50	1 1/4	3 3/4	
2 5/16	8.35	17.25	1 1/4	3 3/4	No. 9
2 3/8	8.70	18.00	1 1/4	3 3/4	
2 7/16	9.05	18.75	1 1/4	3 3/4	
2 1/2	9.40	19.50	1 1/4	3 3/4	
2 9/16	9.80	20.50	1 1/2	4	
2 5/8	10.20	21.50	1 1/2	4	
2 11/16	10.60	22.50	1 1/2	4	No. 10
2 3/4	11.00	23.50	1 1/2	4	
2 13/16	11.40	24.50	1 1/2	4	

See Foot Notes on Page 105.

Continued on next page

THE REAMING LIFE OF 8-10 REAMERS—PAOE 144

Fluted Shell Reamers

Carbon Steel No. 130A

Code Word—LAMECH

High Speed Steel No. 620

Code Word—LOWER

(Eccentric Flutes)

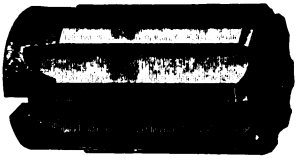
Rose Shell Reamers

Carbon Steel No. 130B

Code Word—LAMED

High Speed Steel No. 622

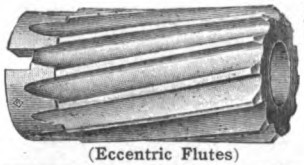
Code Word—LOWERING



Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
2 7/8	$11.80	$27.00	1 1/2	4	
2 15/16	12.20	28.50	1 1/2	4	No. 10
3	12.60	30.00	1 1/2	4	
3 1/16	13.10	31.50	1 3/4	4 1/2	
3 1/8	13.60	33.25	1 3/4	4 1/2	
3 3/16	14.10	35.25	1 3/4	4 1/2	
3 1/4	14.60	37.50	1 3/4	4 1/2	No. 11
3 5/16	15.10	40.00	1 3/4	4 1/2	
3 3/8	15.60	42.50	1 3/4	4 1/2	
3 7/16	16.10	45.25	1 3/4	4 1/2	
3 1/2	16.60	48.00	1 3/4	4 1/2	
3 9/16	17.20	50.75	2	5	
3 5/8	17.80	53.50	2	5	
3 11/16	18.40	56.50	2	5	
3 3/4	19.00	59.50	2	5	No. 12
3 13/16	19.60	62.75	2	5	
3 7/8	20.20	66.00	2	5	
3 15/16	20.80	69.25	2	5	
4	21.40	72.50	2	5	
4 1/8	22.90	79.00	2 1/4	5 1/2	
4 1/4	24.40	85.50	2 1/4	5 1/2	No. 13
4 3/8	25.90	92.00	2 1/4	5 1/2	
4 1/2	27.40	98.50	2 1/4	5 1/2	
4 5/8	29.30	105.00	2 1/2	6	
4 3/4	31.20	111.50	2 1/2	6	
4 7/8	33.10	118.00	2 1/2	6	
5	35.00	125.00	2 1/2	6	No. 14
5 1/8	37.40	132.50	2 1/2	6	
5 1/4	39.80	140.00	2 1/2	6	
5 3/8	42.20	147.50	2 1/2	6	
5 1/2	44.60	155.00	2 1/2	6	
5 5/8	47.60	163.75	2 3/4	6 1/2	
5 3/4	50.60	172.50	2 3/4	6 1/2	No. 15
5 7/8	53.60	181.25	2 3/4	6 1/2	
6	56.60	190.00	2 3/4	6 1/2	

See Foot Notes on Page 105.

DOUBLE PRODUCTION PER DOLLAR—PAGE 154



(Eccentric Flutes)

Spiral Fluted Shell Reamers

Carbon Steel No. 130C

Code Word—LAMEDAL

High Speed Steel No. 646

Code Word—LUBRICITY

Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
1/2	$2.05	$3.25	1/4	2	No. 3
17/32	2.15	3.40	1/4	2	
9/16	2.15	3.40	1/4	2	
19/32	2.30	3.55	1/4	2	
5/8	2.30	3.55	1/4	2	
21/32	2.40	3.70	3/8	2 1/4	No. 4
11/16	2.40	3.70	3/8	2 1/4	
23/32	2.50	3.85	3/8	2 1/4	
3/4	2.50	3.85	3/8	2 1/4	
25/32	2.65	4.00	1/2	2 1/2	No. 5
13/16	2.65	4.00	1/2	2 1/2	
27/32	2.75	4.25	1/2	2 1/2	
7/8	2.75	4.25	1/2	2 1/2	
29/32	2.90	4.50	1/2	2 1/2	
15/16	2.90	4.50	1/2	2 1/2	
31/32	3.00	4.75	1/2	2 1/2	
1	3.00	4.75	1/2	2 1/2	
1 1/32	3.25	5.00	5/8	2 3/4	No. 6
1 1/16	3.25	5.00	5/8	2 3/4	
1 3/32	3.50	5.25	5/8	2 3/4	
1 1/8	3.50	5.25	5/8	2 3/4	
1 5/32	3.70	5.50	5/8	2 3/4	
1 3/16	3.70	5.50	5/8	2 3/4	
1 7/32	3.95	5.75	5/8	2 3/4	
1 1/4	3.95	5.75	5/8	2 3/4	
1 9/32	4.25	6.00	3/4	3	No. 7

Continued on next page

Shell Reamers have taper holes, the diameter given being at the large end.

High Speed Reamers No. 646 are not carried in stock regularly.

All sizes and dimensions not listed are special and subject to special prices. Reamers for brass or bronze require special clearance and are so furnished on request.

For Shell Reamer Arbors, see pages 111, 112, 180.

REAMING? IT WILL PAY YOU TO READ PAGE 154

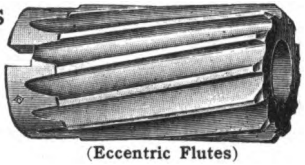
Spiral Fluted Shell Reamers

Carbon Steel No. 130C

Code Word—LAMEDAL

High Speed Steel No. 646

Code Word—LUBRICITY

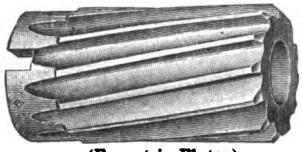


(Eccentric Flutes)

Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
1 5/16	$4.25	$6.00	3/4	3	
1 11/32	4.55	6.50	3/4	3	
1 3/8	4.55	6.50	3/4	3	
1 13/32	4.85	7.00	3/4	3	
1 7/16	4.85	7.00	3/4	3	
1 15/32	5.15	7.50	3/4	3	No. 7
1 1/2	5.15	7.50	3/4	3	
1 17/32	5.45	8.25	3/4	3	
1 9/16	5.45	8.25	3/4	3	
1 19/32	5.75	9.00	3/4	3	
1 5/8	5.75	9.00	3/4	3	
1 21/32	6.10	9.75	1	3 1/2	
1 11/16	6.10	9.75	1	3 1/2	
1 23/32	6.50	10.50	1	3 1/2	
1 3/4	6.50	10.50	1	3 1/2	
1 25/32	6.85	11.25	1	3 1/2	
1 13/16	6.85	11.25	1	3 1/2	No. 8
1 27/32	7.20	12.00	1	3 1/2	
1 7/8	7.20	12.00	1	3 1/2	
1 29/32	7.55	12.75	1	3 1/2	
1 15/16	7.55	12.75	1	3 1/2	
1 31/32	7.90	13.50	1	3 1/2	
2	7.90	13.50	1	3 1/2	
2 1/16	8.35	14.25	1 1/4	3 3/4	
2 1/8	8.75	15.00	1 1/4	3 3/4	
2 3/16	9.20	15.75	1 1/4	3 3/4	
2 1/4	9.60	16.50	1 1/4	3 3/4	No. 9
2 5/16	10.00	17.25	1 1/4	3 3/4	
2 3/8	10.45	18.00	1 1/4	3 3/4	
2 7/16	10.85	18.75	1 1/4	3 3/4	
2 1/2	11.30	19.50	1 1/4	3 3/4	
2 9/16	11.75	20.50	1 1/2	4	
2 5/8	12.25	21.75	1 1/2	4	
2 11/16	12.70	23.00	1 1/2	4	No. 10
2 3/4	13.20	24.25	1 1/2	4	
2 13/16	13.70	25.50	1 1/2	4	

Continued on next page

See Foot Notes on Page 108.



(Eccentric Flutes)

Spiral Fluted Shell Reamers

Carbon Steel No. 130C

Code Word—LAMEDAL

High Speed Steel No. 646

Code Word—LUBRICITY

Diameter Inches	Price Each		Size Hole Inches	Length Over All Inches	Fitting Arbor
	Carbon Steel	High Speed			
2 7/8	$14.15	$27.00	1 1/2	4	No. 10
2 15/16	14.65	28.50	1 1/2	4	
3	15.10	30.00	1 1/2	4	
3 1/16	15.70	31.50	1 3/4	4 1/2	No. 11
3 1/8	16.30	33.25	1 3/4	4 1/2	
3 3/16	16.90	35.25	1 3/4	4 1/2	
3 1/4	17.50	37.50	1 3/4	4 1/2	
3 5/16	18.10	40.00	1 3/4	4 1/2	
3 3/8	18.70	42.50	1 3/4	4 1/2	
3 7/16	19.30	45.25	1 3/4	4 1/2	
3 1/2	19.90	48.00	1 3/4	4 1/2	
3 9/16	20.65	50.75	2	5	No. 12
3 5/8	21.35	53.50	2	5	
3 11/16	22.10	56.50	2	5	
3 3/4	22.80	59.50	2	5	
3 13/16	23.50	62.75	2	5	
3 7/8	24.25	66.00	2	5	
3 15/16	24.95	69.25	2	5	
4	25.70	72.50	2	5	
4 1/8	27.50	79.00	2 1/4	5 1/2	No. 13
4 1/4	29.30	85.50	2 1/4	5 1/2	
4 3/8	31.10	92.00	2 1/4	5 1/2	
4 1/2	32.90	98.50	2 1/4	5 1/2	
4 5/8	35.15	105.00	2 1/2	6	No. 14
4 3/4	37.45	111.50	2 1/2	6	
4 7/8	39.70	118.00	2 1/2	6	
5	42.00	125.00	2 1/2	6	
5 1/8	44.90	132.50	2 1/2	6	
5 1/4	47.75	140.00	2 1/2	6	
5 3/8	50.65	147.50	2 1/2	6	
5 1/2	53.50	155.00	2 1/2	6	
5 5/8	57.10	163.75	2 3/4	6 1/2	No. 15
5 3/4	60.70	172.50	2 3/4	6 1/2	
5 7/8	64.30	181.25	2 3/4	6 1/2	
6	67.90	190.00	2 3/4	6 1/2	

See Foot Notes on Page 108.

BLADES COST LESS THAN REAMERS. SEE PAGE 144

Reamers and Arbors

"Cleveland" Patent Arbors for Shell Tools

Patented December 15th, 1908

No. 78—Straight Shank

For Code Words See Page 234

No. 79—Taper Shank

For Code Words See Page 234

This Arbor is provided with a sliding collar which can be forced forward by a turn or two of the adjusting nut which bears on it, thus quickly releasing the shell tool, no matter how hard it may have become jammed on the arbor, without removing the arbor from the machine.

The device not only saves time, but insures against the damage which so often comes from trying to force a tight fitting tool off the ordinary arbor. For cut showing construction see page 198.

Size No.	Price No. 78 Straight Shank	Price No. 79 Taper Shank	Fitting Sizes Inches	Length Over All Inches	Taper Shank
3	$3.60	$4.35	1/2 to 5/8	8	No. 1
4	4.05	4.90	41/64 to 3/4	9	No. 2
5	4.50	5.40	49/64 to 1	9 1/2	
6	4.95	5.95	1 1/64 to 1 1/4	10	No. 3
7	5.40	6.45	1 17/64 to 1 3/8	11	
8	6.00	7.20	1 41/64 to 2	12	No. 4
9	6.75	8.10	2 1/64 to 2 1/2	13	
10	7.90	9.45	2 33/64 to 3	14	
11	11.25	13.50	3 1/64 to 3 1/2	15	
12	15.75	18.90	3 33/64 to 4	16	No. 5
13	20.25	24.30	4 1/64 to 4 1/2	17	
14	27.00	32.40	4 33/64 to 5 1/2	18	
15	33.00	39.60	5 33/64 to 6	19	No. 6

Shell Reamers on pages 105, 106, 107, 108, 109, 110, 146, 147, 166, 167. Shell Drills on pages 50, 51.

No. 133—Arbors for Shell Reamers and Shell Drills

For Code Words See Page 236

Size No.	Price Each	Fitting Sizes 130A and 130B Shell Reamers Inches	Length Over All Inches	Size No.	Price Each	Fitting Sizes 130A and 130B Shell Reamers Inches	Length Over All Inches
3	$2.40	½ to 5/8	8	10	$5.25	2 33/64 to 3	14
4	2.70	41/64 to ¾	9	11	7.50	3 1/64 to 3½	15
5	3.00	49/64 to 1	9½	12	10.50	3 33/64 to 4	16
6	3.30	1 1/64 to 1¼	10	13	13.50	4 1/64 to 4½	17
7	3.60	1 17/64 to 1 5/8	11	14	18.00	4 33/64 to 5½	18
8	4.00	1 41/64 to 2	12	15	22.00	5 33/64 to 6	19
9	4.50	2 1/64 to 2½	13				

No. 133A—Taper Shank Arbors for Shell Reamers and Shell Drills

For Code Words See Page 236

Size No.	Price Each	Fitting Sizes 130A and 130B Shell Reamers Inches	Length Over All Inches	Shank Taper
3	$2.90	½ to 5/8	8	No. 1
4	3.25	41/64 to ¾	9	No. 2
5	3.60	49/64 to 1	9½	
6	3.95	1 1/64 to 1¼	10	No. 3
7	4.30	1 17/64 to 1 5/8	11	
8	4.80	1 41/64 to 2	12	No. 4
9	5.40	2 1/64 to 2½	13	
10	6.30	2 33/64 to 3	14	
11	9.00	3 1/64 to 3½	15	
12	12.60	3 33/64 to 4	16	No. 5
13	16.20	4 1/64 to 4½	17	
14	21.60	4 33/64 to 5½	18	
15	26.40	5 33/64 to 6	19	No. 6

For Shell Reamers, see pages 105, 106, 107, 108, 109, 110, 146, 147, 166, 167. For Shell Drills, see pages 50, 51.

No. 129—Common Sense Expansion Reamers

Code Word—LAMBKIN

(Eccentric Flutes)

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/4	$3.00	2	3 3/4	31/32	$6.50	4 3/4	8 9/32
9/32	3.05	2 1/8	3 7/8	1	6.75	4 7/8	8 1/2
5/16	3.10	2 13/64	4	1 1/16	7.25	5 1/8	9
11/32	3.15	2 5/16	4 1/8	1 1/8	7.75	5 1/4	9 1/4
3/8	3.20	2 1/2	4 1/4	1 3/16	8.30	5 3/8	9 9/16
13/32	3.25	2 7/16	4 3/8	1 1/4	8.90	5 1/2	9 7/8
7/16	3.30	2 33/64	4 1/2	1 5/16	9.50	5 3/4	10 1/8
15/32	3.35	2 33/64	4 3/4	1 3/8	10.50	5 7/8	10 3/8
1/2	3.40	2 33/64	5	1 7/16	11.50	5 13/16	10 5/8
17/32	3.50	2 5/8	5 5/16	1 1/2	12.50	6	10 3/4
9/16	3.65	2 3/4	5 3/8	1 9/16	13.00	6 1/8	11 1/8
19/32	3.80	2 7/8	5 9/16	1 5/8	13.50	6 1/4	11 1/4
5/8	4.00	3 1/8	5 3/4	1 11/16	14.00	6 3/8	11 3/8
21/32	4.20	3 5/16	6	1 3/4	14.50	6 1/2	11 1/2
11/16	4.40	3 1/2	6 1/4	1 13/16	15.00	6 5/8	11 3/4
23/32	4.60	3 9/16	6 7/16	1 7/8	15.50	6 3/4	11 3/4
3/4	4.80	3 5/8	6 5/8	1 15/16	16.00	6 7/8	12
25/32	5.00	3 13/16	6 7/8	2	16.50	7	12 1/4
13/16	5.25	4	7 1/8	2 1/8	17.50	7 1/8	12 5/8
27/32	5.50	4 3/16	7 3/8	2 1/4	18.50	7 1/4	13
7/8	5.75	4 5/16	7 9/16	2 3/8	19.50	7 3/8	13 1/2
29/32	6.00	4 7/16	7 13/16	2 1/2	20.50	7 1/2	14
15/16	6.25	4 9/16	8 1/16				

Limits of expansion recommended for these reamers are as follows: Sizes 1/4 to 13/32, .005 inch; 1/2 to 31/32, .008 inch; 1 inch to 1 29/32, .010 inch; 1 3/4 to 2 1/2, .012 inch. The pilots on these reamers are ground slightly undersize. Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

ADJUSTABLE REAMERS? "PARADOX" ON PAGE 144

Hand Reamers

Carbon Steel No. 128A — **Code Word—LAMB**

High Speed Steel No. 624 — Code Word—LOWERMOST

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1/8	$1.00	$3.00	1 1/2	3	15/32	$1.85	$5.25	2 7/8	5 3/4
9/64	1.10	3.25	1 5/8	3 1/4	31/64	1.90	5.25	3	6
5/32	1.10	3.25	1 5/8	3 1/4	1/2	1.90	5.25	3	6
11/64	1.20	3.25	1 3/4	3 1/2	17/32	1.95	5.75	3 1/8	6 1/4
3/16	1.20	3.25	1 3/4	3 1/2	9/16	2.00	5.75	3 1/4	6 1/2
13/64	1.30	3.50	1 7/8	3 3/4	19/32	2.10	6.25	3 3/8	6 3/4
7/32	1.30	3.50	1 7/8	3 3/4	5/8	2.20	6.25	3 1/2	7
15/64	1.40	3.50	2	4	21/32	2.30	6.75	3 11/16	7 11/32
1/4	1.40	3.50	2	4	11/16	2.40	6.75	3 27/32	7 11/16
17/64	1.45	3.75	2 1/8	4 1/4	23/32	2.50	7.25	4 1/16	8 1/8
9/32	1.45	3.75	2 1/8	4 1/4	3/4	2.60	7.25	4 5/16	8 3/8
19/64	1.50	3.75	2 1/4	4 1/2	25/32	2.70	7.75	4 23/32	8 23/32
5/16	1.50	3.75	2 1/4	4 1/2	13/16	2.80	7.75	4 17/32	9 1/16
21/64	1.55	4.25	2 3/8	4 3/4	27/32	2.95	8.50	4 11/16	9 3/8
11/32	1.55	4.25	2 3/8	4 3/4	7/8	3.10	8.50	4 27/32	9 11/16
23/64	1.60	4.25	2 1/2	5	29/32	3.25	9.50	5 3/64	10 3/32
3/8	1.60	4.25	2 1/2	5	15/16	3.40	9.50	5 1/8	10 1/4
25/64	1.70	4.75	2 5/8	5 1/4	31/32	3.55	10.50	5 11/32	10 11/16
13/32	1.70	4.75	2 5/8	5 1/4	1	3.70	10.50	5 7/16	10 7/8
27/64	1.75	4.75	2 3/4	5 1/2	1 1/32	3.85	11.50	5 17/32	11 1/16
7/16	1.75	4.75	2 3/4	5 1/2	1 1/16	4.00	11.50	5 5/8	11 1/4
29/64	1.85	5.25	2 7/8	5 3/4	1 3/32	4.15	12.75	5 23/32	11 7/16

Continued on next page

High Speed Reamers No. 624 are not carried in stock regularly in sizes 1/2-inch and larger. We recommend "Peerless" High Speed Reamers Nos. 501 and 502 on pages 156 and 157.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

For Reamers in Sets, see page 138.

WHEN A STUD SNAPS SEE PAGE 174

Hand Reamers

Carbon Steel No. 128A

Code Word—LAMB

High Speed Steel No. 624

Code Word—LOWERMOST

(Eccentric Flutes)

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1 1/8	$4.30	$12.75	5 13/16	11 5/8	1 27/32	$8.60	$33.50	6 3/4	13 1/2
1 5/32	4.45	14.25	5 29/32	11 13/16	1 7/8	8.80	33.50	7	14
1 3/16	4.60	14.25	6	12	1 29/32	9.00	35.75	7	14
1 7/32	4.75	15.75	6 1/16	12 1/8	1 15/16	9.20	35.75	7	14
1 1/4	4.90	15.75	6 1/8	12 1/4	1 31/32	9.40	38.00	7	14
1 9/32	5.05	17.25	6 11/64	12 11/32	2	9.60	38.00	7	14
1 5/16	5.20	17.25	6 7/32	12 7/16	2 1/16	10.00	40.75	7 1/4	14 1/2
1 11/32	5.40	18.75	6 17/64	12 17/32	2 1/8	10.40	43.50	7 1/4	14 1/2
1 3/8	5.60	18.75	6 5/16	12 5/8	2 3/16	10.80	46.25	7 1/2	15
1 13/32	5.80	20.50	6 21/64	12 23/32	2 1/4	11.30	49.00	7 1/2	15
1 7/16	6.00	20.50	6 11/32	12 13/16	2 5/16	11.80	51.75	7 1/2	15
1 15/32	6.20	22.25	6 23/64	12 29/32	2 3/8	12.30	55.00	7 1/2	15
1 1/2	6.40	22.25	6 1/2	13	2 7/16	12.80	58.25	7 3/4	15 1/2
1 17/32	6.60	24.00	6 1/2	13	2 1/2	13.40	61.50	7 3/4	15 1/2
1 9/16	6.80	24.00	6 1/2	13	2 9/16	14.00	64.75	7 3/4	15 1/2
1 19/32	7.00	25.75	6 1/2	13	2 5/8	14.60	68.00	8	16
1 5/8	7.20	25.75	6 1/2	13	2 11/16	15.40	71.25	8	16
1 21/32	7.40	27.50	6 3/4	13 1/2	2 3/4	16.20	74.50	8	16
1 11/16	7.60	27.50	6 3/4	13 1/2	2 13/16	17.00	77.75	8 1/4	16 1/2
1 23/32	7.80	29.50	6 3/4	13 1/2	2 7/8	17.80	81.00	8 1/4	16 1/2
1 3/4	8.00	29.50	6 3/4	13 1/2	2 15/16	18.60	84.25	8 1/4	16 1/2
1 25/32	8.20	31.50	6 3/4	13 1/2	3	19.40	87.50	8 1/4	16 1/2
1 13/16	8.40	31.50	6 3/4	13 1/2					

High Speed Reamers No. 624 are not carried in stock regularly in sizes ¼-inch and larger. We recommend "Peerless" High Speed Reamers Nos. 501 and 502 on pages 156 and 157.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

For Reamers in Sets, see page 138.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Spiral Fluted Hand Reamers

Carbon Steel No. 128C
Code Word—LAMBIA

High Speed Steel No. 645
Code Word—LUBRICATE

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1/8	$1.20	$3.00	1 1/2	3	15/32	$2.20	$5.25	2 7/8	5 3/4
9/64	1.30	3.25	1 5/8	3 1/4	31/64	2.30	5.25	3	6
5/32	1.30	3.25	1 5/8	3 1/4	1/2	2.30	5.25	3	6
11/64	1.45	3.25	1 3/4	3 1/2	17/32	2.35	5.75	3 1/8	6 1/4
3/16	1.45	3.25	1 3/4	3 1/2	9/16	2.40	5.75	3 1/4	6 1/2
13/64	1.55	3.50	1 7/8	3 3/4	19/32	2.50	6.25	3 3/8	6 3/4
7/32	1.55	3.50	1 7/8	3 3/4	5/8	2.65	6.25	3 1/2	7
15/64	1.70	3.50	2	4	21/32	2.75	6.75	3 43/64	7 11/32
1/4	1.70	3.50	2	4	11/16	2.90	6.75	3 27/32	7 11/16
17/64	1.75	3.75	2 1/8	4 1/4	23/32	3.00	7.25	4 1/16	8 1/8
9/32	1.75	3.75	2 1/8	4 1/4	3/4	3.10	7.25	4 3/16	8 3/8
19/64	1.80	3.75	2 1/4	4 1/2	25/32	3.25	7.75	4 23/64	8 23/32
5/16	1.80	3.75	2 1/4	4 1/2	13/16	3.35	7.75	4 17/32	9 1/16
21/64	1.85	4.25	2 3/8	4 3/4	27/32	3.55	8.50	4 11/16	9 3/8
11/32	1.85	4.25	2 3/8	4 3/4	7/8	3.70	8.50	4 27/32	9 11/16
23/64	1.90	4.25	2 1/2	5	29/32	3.90	9.50	5 3/64	10 3/32
3/8	1.90	4.25	2 1/2	5	15/16	4.10	9.50	5 1/8	10 1/4
25/64	2.05	4.75	2 5/8	5 1/4	31/32	4.25	10.50	5 11/32	10 11/16
13/32	2.05	4.75	2 5/8	5 1/4	1	4.45	10.50	5 7/16	10 7/8
27/64	2.15	4.75	2 3/4	5 1/2	1 1/32	4.60	11.50	5 17/32	11 1/16
7/16	2.15	4.75	2 3/4	5 1/2	1 1/16	4.80	11.50	5 5/8	11 1/4
29/64	2.20	5.25	2 7/8	5 3/4	1 3/32	5.00	12.75	5 23/32	11 7/16

Continued on next page

High Speed Reamers No. 645 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

REAMING? IT WILL PAY YOU TO READ PAGE 154

Spiral Fluted Hand Reamers

Carbon Steel No. 128C — **Code Word—LAMBIA**

High Speed Steel No. 645 — Code Word—LUBRICATE

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1 1/8	$5.15	$12.75	5 13/16	11 5/8	1 27/32	$10.30	$33.50	6 3/4	13 1/2
1 5/32	5.35	14.25	5 29/32	11 13/16	1 7/8	10.55	33.50	7	14
1 3/16	5.50	14.25	6	12	1 29/32	10.80	35.75	7	14
1 7/32	5.70	15.75	6 1/16	12 1/8	1 15/16	11.05	35.75	7	14
1 1/4	5.90	15.75	6 1/8	12 1/4	1 31/32	11.30	38.00	7	14
1 9/32	6.05	17.25	6 11/64	12 11/32	2	11.50	38.00	7	14
1 5/16	6.25	17.25	6 7/32	12 7/16	2 1/16	12.00	40.75	7 1/4	14 1/2
1 11/32	6.50	18.75	6 17/64	12 17/32	2 1/8	12.50	43.50	7 1/4	14 1/2
1 3/8	6.70	18.75	6 5/16	12 5/8	2 3/16	12.95	46.25	7 1/2	15
1 13/32	6.95	20.50	6 23/64	12 23/32	2 1/4	13.55	49.00	7 1/2	15
1 7/16	7.20	20.50	6 13/32	12 13/16	2 5/16	14.15	51.75	7 1/2	15
1 15/32	7.45	22.25	6 29/64	12 29/32	2 3/8	14.75	55.00	7 1/2	15
1 1/2	7.70	22.25	6 1/2	13	2 7/16	15.35	58.25	7 3/4	15 1/2
1 17/32	7.90	24.00	6 1/2	13	2 1/2	16.10	61.50	7 3/4	15 1/2
1 9/16	8.15	24.00	6 1/2	13	2 9/16	16.80	64.75	7 3/4	15 1/2
1 19/32	8.40	25.75	6 1/2	13	2 5/8	17.50	68.00	8	16
1 5/8	8.65	25.75	6 1/2	13	2 11/16	18.50	71.25	8	16
1 21/32	8.90	27.50	6 3/4	13 1/2	2 3/4	19.45	74.50	8	16
1 11/16	9.10	27.50	6 3/4	13 1/2	2 13/16	20.40	77.75	8 1/4	16 1/2
1 23/32	9.35	29.50	6 3/4	13 1/2	2 7/8	21.35	81.00	8 1/4	16 1/2
1 3/4	9.60	29.50	6 3/4	13 1/2	2 15/16	22.30	84.25	8 1/4	16 1/2
1 25/32	9.85	31.50	6 3/4	13 1/2	3	23.30	87.50	8 1/4	16 1/2
1 13/16	10.10	31.50	6 3/4	13 1/2					

High Speed Reamers No. 645 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

WHAT IS "BRAZO-HARDENING"—SEE PAGE 154

Cleveland Self-Feeding Reamers

Carbon Steel No. 128

Code Word—LAKELET

High Speed Steel No. 626

Code Word—LOWERMAN

(Eccentric Flutes)

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1/4	$1.55	$3.50	2	4	5/8	$2.40	$6.25	3 1/2	7
17/64	1.60	3.75	2 1/8	4 1/4	21/32	2.55	6.75	3 43/64	7 11/32
9/32	1.60	3.75	2 1/8	4 1/4	11/16	2.65	6.75	3 27/32	7 11/16
19/64	1.65	3.75	2 1/4	4 1/2	23/32	2.75	7.25	4 1/16	8 1/8
5/16	1.65	3.75	2 1/4	4 1/2	3/4	2.85	7.25	4 3/16	8 3/8
21/64	1.70	4.25	2 3/8	4 3/4	25/32	3.00	7.75	4 23/64	8 23/32
11/32	1.70	4.25	2 3/8	4 3/4	13/16	3.10	7.75	4 17/32	9 1/16
23/64	1.75	4.25	2 1/2	5	27/32	3.25	8.50	4 11/16	9 3/8
3/8	1.75	4.25	2 1/2	5	7/8	3.40	8.50	4 27/32	9 11/16
25/64	1.85	4.75	2 5/8	5 1/4	29/32	3.60	9.50	5 3/64	10 3/32
13/32	1.85	4.75	2 5/8	5 1/4	15/16	3.75	9.50	5 1/8	10 1/4
27/64	1.95	4.75	2 3/4	5 1/2	31/32	3.90	10.50	5 11/32	10 11/16
7/16	1.95	4.75	2 3/4	5 1/2	1	4.05	10.50	5 7/16	10 7/8
29/64	2.05	5.25	2 7/8	5 3/4	1 1/32	4.25	11.50	5 17/32	11 1/16
15/32	2.05	5.25	2 7/8	5 3/4	1 1/16	4.40	11.50	5 5/8	11 1/4
31/64	2.10	5.25	3	6	1 3/32	4.55	12.75	5 23/32	11 7/16
1/2	2.10	5.25	3	6	1 1/8	4.75	12.75	5 13/16	11 5/8
17/32	2.15	5.75	3 1/8	6 1/4	1 5/32	4.90	14.25	5 29/32	11 13/16
9/16	2.20	5.75	3 1/4	6 1/2	1 3/16	5.05	14.25	6	12
19/32	2.30	6.25	3 3/8	6 3/4	1 7/32	5.25	15.75	6 1/16	12 1/8

Continued on next page

High Speed Reamers No. 626 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

For Reamers in Sets, see page 138.

ADJUSTABLE REAMERS? "PARADOX" ON PAGE 144

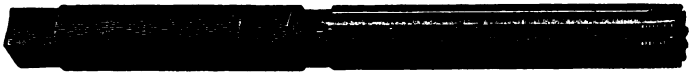
Cleveland Self-Feeding Reamers

Carbon Steel No. 128

Code Word—LAKELET

High Speed Steel No. 626

Code Word—LOWERMAN



(Eccentric Flutes)

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1 1/4	$5.40	$15.75	6 1/8	12 1/4	1 29/32	$9.90	$35.75	7	14
1 9/32	5.55	17.25	6 11/64	12 11/32	1 15/16	10.10	35.75	7	14
1 5/16	5.70	17.25	6 7/32	12 7/16	1 31/32	10.35	38.00	7	14
1 11/32	5.95	18.75	6 17/64	12 17/32	2	10.55	38.00	7	14
1 3/8	6.15	18.75	6 5/16	12 5/8	2 1/16	11.00	40.75	7 1/4	14 1/2
1 13/32	6.40	20.50	6 23/64	12 23/32	2 1/8	11.45	43.50	7 1/4	14 1/2
1 7/16	6.60	20.50	6 13/32	12 13/16	2 3/16	11.90	46.25	7 1/2	15
1 15/32	6.80	22.25	6 29/64	12 29/32	2 1/4	12.45	49.00	7 1/2	15
1 1/2	7.05	22.25	6 1/2	13	2 5/16	13.00	51.75	7 1/2	15
1 17/32	7.25	24.00	6 1/2	13	2 3/8	13.55	55.00	7 1/2	15
1 9/16	7.50	24.00	6 1/2	13	2 7/16	14.10	58.25	7 3/4	15 1/2
1 19/32	7.70	25.75	6 1/2	13	2 1/2	14.75	61.50	7 3/4	15 1/2
1 5/8	7.90	25.75	6 1/2	13	2 9/16	15.40	64.75	7 3/4	15 1/2
1 21/32	8.15	27.50	6 3/4	13 1/2	2 5/8	16.05	68.00	8	16
1 11/16	8.35	27.50	6 3/4	13 1/2	2 11/16	16.95	71.25	8	16
1 23/32	8.60	29.50	6 3/4	13 1/2	2 3/4	17.80	74.50	8	16
1 3/4	8.80	29.50	6 3/4	13 1/2	2 13/16	18.70	77.75	8 1/4	16 1/2
1 25/32	9.00	31.50	6 3/4	13 1/2	2 7/8	19.60	81.00	8 1/4	16 1/2
1 13/16	9.25	31.50	6 3/4	13 1/2	2 15/16	20.45	84.25	8 1/4	16 1/2
1 27/32	9.45	33.50	6 3/4	13 1/2	3	21.35	87.50	8 1/4	16 1/2
1 7/8	9.70	33.50	7	14					

High Speed Reamers No. 626 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

For Reamers in Sets, see page 138.

WHEN A SET SCREW SNAPS SEE PAGE 174

Taper Shank Jobbers' Reamers

Carbon Steel No. 128B

Code Word—LAMBERT

High Speed Steel No. 628

Code Word—LOWERY

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
1/4	$1.70	$4.00	2	5 3/16	
17/64	1.75	4.25	2	5 3/16	
9/32	1.75	4.25	2	5 3/16	
19/64	1.80	4.25	2 1/4	5 1/2	
5/16	1.80	4.25	2 1/4	5 1/2	
21/64	1.85	4.75	2 1/4	5 1/2	
11/32	1.85	4.75	2 1/4	5 1/2	
23/64	1.90	4.75	2 1/2	5 13/16	
3/8	1.90	4.75	2 1/2	5 13/16	
25/64	2.05	5.25	2 1/2	5 13/16	
13/32	2.05	5.25	2 1/2	5 13/16	No. 1
27/64	2.15	5.25	2 3/4	6 1/8	
7/16	2.15	5.25	2 3/4	6 1/8	
29/64	2.20	5.75	2 3/4	6 1/8	
15/32	2.20	5.75	2 3/4	6 1/8	
31/64	2.30	5.75	3	6 7/16	
1/2	2.30	5.75	3	6 7/16	
17/32	2.35	6.25	3	6 7/16	
9/16	2.40	6.25	3 1/4	6 3/4	
19/32	2.50	6.75	3 1/4	6 3/4	
5/8	2.65	6.75	3 1/2	7 9/16	
21/32	2.75	7.25	3 1/2	7 9/16	
11/16	2.90	7.25	3 7/8	8	
23/32	3.00	7.75	3 7/8	8	
3/4	3.10	7.75	4 3/16	8 3/8	No. 2
25/32	3.25	8.50	4 3/16	8 3/8	
13/16	3.35	8.50	4 9/16	8 13/16	
27/32	3.55	9.50	4 9/16	8 13/16	
7/8	3.70	9.50	4 7/8	9 3/16	
29/32	3.90	10.50	4 7/8	9 3/16	
15/16	4.10	10.50	5 1/8	10	No. 3
31/32	4.25	11.50	5 1/8	10	

Continued on next page

High Speed Reamers No. 628 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

GETTING PRODUCTION? IF NOT, SEE PAGE 89

Taper Shank Jobbers' Reamers

Carbon Steel No. 128B

Code Word—LAMBERT

High Speed Steel No. 628

Code Word—LOWERY

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
1	$4.45	$11.50	5 1/16	10 3/8	
1 1/32	4.60	12.50	5 1/16	10 3/8	
1 1/16	4.80	12.50	5 5/8	10 5/8	
1 3/32	5.00	13.75	5 5/8	10 5/8	
1 1/8	5.15	13.75	5 13/16	10 7/8	No. 3
1 5/32	5.35	15.25	5 13/16	10 7/8	
1 3/16	5.50	15.25	6	11 1/8	
1 7/32	5.70	16.75	6	11 1/8	
1 1/4	5.90	16.75	6 1/8	12 1/2	
1 9/32	6.05	18.25	6 1/8	12 1/2	
1 5/16	6.25	18.25	6 1/4	12 11/16	
1 11/32	6.50	19.75	6 1/4	12 11/16	
1 3/8	6.70	19.75	6 5/16	12 13/16	
1 13/32	6.95	21.50	6 5/16	12 13/16	
1 7/16	7.20	21.50	6 7/16	13	
1 15/32	7.45	23.25	6 7/16	13	
1 1/2	7.70	23.25	6 1/2	13 1/8	No. 4
1 17/32	7.90	25.00	6 1/2	13 1/8	
1 9/16	8.15	25.00	6 1/2	13 1/8	
1 19/32	8.40	26.75	6 1/2	13 1/8	
1 5/8	8.65	26.75	6 1/2	13 1/8	
1 21/32	8.90	28.50	6 1/2	13 1/8	
1 11/16	9.10	28.50	6 3/4	13 3/8	
1 23/32	9.35	30.50	6 3/4	13 3/8	
1 3/4	9.60	30.50	6 3/4	14 11/16	
1 25/32	9.85	32.50	6 3/4	14 11/16	
1 13/16	10.10	32.50	6 3/4	14 11/16	
1 27/32	10.30	34.50	6 3/4	14 11/16	
1 7/8	10.55	34.50	7	15	No. 5
1 29/32	10.80	36.75	7	15	
1 15/16	11.05	36.75	7	15	
1 31/32	11.30	39.00	7	15	
2	11.50	39.00	7	15	

High Speed Reamers No. 628 are not carried in stock regularly.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

FOR IDEAL MACHINE REAMERS SEE PAGE 154

Fluted Chucking Reamers

Carbon Steel No. 134

Code Word—LAMPOON

High Speed Steel No. 630

Code Word—LOWLIVED

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1/8	$0.90	$2.00	7/8	3 3/4	22/32	$3.25	$9.00	2 5/8	10
5/32	.95	2.25	1 1/4	5	11/16	3.25	9.00	2 5/8	10
3/16	1.00	2.50	1 1/4	5	31/32	3.45	10.00	2 5/8	10
7/32	1.10	2.75	1 1/4	5	1	3.45	10.00	2 3/4	10 1/2
1/4	1.20	3.00	1 1/2	6	1 1/32	3.70	11.25	2 3/4	10 1/2
9/32	1.30	3.25	1 1/2	6	1 1/16	3.70	11.25	2 3/4	10 1/2
5/16	1.30	3.25	1 1/2	6	1 3/32	3.90	12.50	2 3/4	10 1/2
11/32	1.45	3.75	1 1/2	6	1 1/8	3.90	12.50	2 7/8	11
3/8	1.45	3.75	1 3/4	7	1 5/32	4.15	13.75	2 7/8	11
13/32	1.60	4.25	1 3/4	7	1 3/16	4.15	13.75	2 7/8	11
7/16	1.60	4.25	1 3/4	7	1 7/32	4.35	15.25	2 7/8	11
15/32	1.80	4.75	1 3/4	7	1 1/4	4.35	15.25	3	11 1/2
1/2	1.80	4.75	2	8	1 5/16	4.60	17.00	3	11 1/2
17/32	2.00	5.25	2	8	1 3/8	4.80	18.75	3 1/4	12
9/16	2.00	5.25	2	8	1 7/16	5.05	20.50	3 1/4	12
19/32	2.25	5.75	2	8	1 1/2	5.25	22.25	3 1/2	12 1/2
5/8	2.25	5.75	2 1/4	9	1 9/16	5.50	24.00	3 1/2	12 1/2
21/32	2.40	6.25	2 1/4	9	1 5/8	5.75	25.75	3 3/4	13
11/16	2.40	6.25	2 1/4	9	1 11/16	6.00	27.50	3 3/4	13
23/32	2.55	6.75	2 1/4	9	1 3/4	6.30	29.50	4	13 1/2
3/4	2.55	6.75	2 1/2	9 1/2	1 13/16	6.60	31.50	4	13 1/2
25/32	2.80	7.25	2 1/2	9 1/2	1 7/8	6.90	33.50	4 1/4	14
13/16	2.80	7.25	2 1/2	9 1/2	1 15/16	7.20	35.75	4 1/4	14
27/32	3.00	8.00	2 1/2	9 1/2	2	7.50	38.00	4 1/4	14
7/8	3.00	8.00	2 5/8	10					

High Speed Reamers No. 630 are not carried in stock regularly in sizes ½ inch and larger. We recommend "Peerless" High Speed Reamers Nos. 503 and 504 on pages 158, 159.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

ADJUSTABLE YET SOLID—IT'S A "PARADOX"

Fluted Chucking Reamers with Taper Shanks

Carbon Steel No. 134A

Code Word—LANCELO

High Speed Steel No. 632

Code Word—LOWMIND

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
1/4	$1.45	$3.50	1 1/2	6	
9/32	1.55	3.75	1 1/2	6	
5/16	1.55	3.75	1 1/2	6	
11/32	1.75	4.25	1 1/2	6	
3/8	1.75	4.25	1 3/4	7	
13/32	1.90	4.75	1 3/4	7	
7/16	1.90	4.75	1 3/4	7	No. 1
15/32	2.15	5.25	1 3/4	7	
1/2	2.15	5.25	2	8	
17/32	2.40	5.75	2	8	
9/16	2.40	5.75	2	8	
19/32	2.70	6.25	2	8	
5/8	2.70	6.25	2 1/4	9	
21/32	2.90	6.75	2 1/4	9	
11/16	2.90	6.75	2 1/4	9	
23/32	3.05	7.25	2 1/4	9	
3/4	3.05	7.25	2 1/2	9 1/2	
25/32	3.35	8.00	2 1/2	9 1/2	No. 2
13/16	3.35	8.00	2 1/2	9 1/2	
27/32	3.60	9.00	2 1/2	9 1/2	
7/8	3.60	9.00	2 5/8	10	
29/32	3.90	10.00	2 5/8	10	

Continued on next page

High Speed Reamers No. 632 are not carried in stock regularly in sizes 1/2 inch and larger. We recommend "Peerless" High Speed Reamers Nos. 515 and 516, on pages 162 and 163.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Fluted Chucking Reamers with Taper Shanks

Carbon Steel No. 134A

Code Word—LANCELO

High Speed Steel No. 632

Code Word—LOWMIND

(Eccentric Flutes)

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
15/16	$3.90	$10.00	2 5/8	10	No. 3
31/32	4.15	11.00	2 5/8	10	
1	4.15	11.00	2 3/4	10 1/2	
1 1/32	4.45	12.25	2 3/4	10 1/2	
1 1/16	4.45	12.25	2 3/4	10 1/2	
1 3/32	4.70	13.50	2 3/4	10 1/2	
1 1/8	4.70	13.50	2 7/8	11	
1 5/32	5.00	14.75	2 7/8	11	
1 3/16	5.00	14.75	2 7/8	11	
1 7/32	5.20	16.25	2 7/8	11	
1 1/4	5.20	16.25	3	11 1/2	No. 4
1 5/16	5.50	18.00	3	11 1/2	
1 3/8	5.75	19.75	3 1/4	12	
1 7/16	6.05	21.50	3 1/4	12	
1 1/2	6.30	23.25	3 1/2	12 1/2	
1 9/16	6.60	25.00	3 1/2	12 1/2	
1 5/8	6.90	26.75	3 3/4	13	
1 11/16	7.20	28.50	3 3/4	13	
1 3/4	7.55	30.50	4	13 1/2	No. 5
1 13/16	7.90	32.50	4	13 1/2	
1 7/8	8.30	34.50	4 1/4	14	
1 15/16	8.65	36.75	4 1/4	14	
2	9.00	39.00	4 1/4	14	

High Speed Reamers No. 632 are not carried in stock regularly in sizes ½ inch and larger. We recommend "Peerless" High Speed Reamers Nos. 515 and 516, on pages 162 and 163.

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

"PEERLESS" REAMERS REDUCE REAMING COSTS

Rose Chucking Reamers

Carbon Steel No. 136

Code Word—LANDAU

High Speed Steel No. 634

Code Word—LOWNECK

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches
1/8	$0.90	$2.00	7/8	3 3/4	29/32	$3.25	$9.00	2 5/8	10
5/32	.95	2.25	1 1/4	5	15/16	3.25	9.00	2 5/8	10
3/16	1.00	2.50	1 1/4	5	31/32	3.45	10.00	2 5/8	10
7/32	1.10	2.75	1 1/4	5	1	3.45	10.00	2 3/4	10 1/2
1/4	1.20	3.00	1 1/2	6	1 1/32	3.70	11.25	2 3/4	10 1/2
9/32	1.30	3.25	1 1/2	6	1 1/16	3.70	11.25	2 3/4	10 1/2
5/16	1.30	3.25	1 1/2	6	1 3/32	3.90	12.50	2 3/4	10 1/2
11/32	1.45	3.75	1 1/2	6	1 1/8	3.90	12.50	2 7/8	11
3/8	1.45	3.75	1 3/4	7	1 5/32	4.15	13.75	2 7/8	11
13/32	1.60	4.25	1 3/4	7	1 1/16	4.15	13.75	2 7/8	11
7/16	1.60	4.25	1 3/4	7	1 7/32	4.35	15.25	2 7/8	11
15/32	1.80	4.75	1 3/4	7	1 1/4	4.35	15.25	3	11 1/2
1/2	1.80	4.75	2	8	1 5/16	4.60	17.00	3	11 1/2
17/32	2.00	5.25	2	8	1 3/8	4.80	18.75	3 1/4	12
9/16	2.00	5.25	2	8	1 7/16	5.05	20.50	3 1/4	12
19/32	2.25	5.75	2	8	1 1/2	5.25	22.25	3 1/2	12 1/2
5/8	2.25	5.75	2 1/4	9	1 9/16	5.50	24.00	3 1/2	12 1/2
21/32	2.40	6.25	2 1/4	9	1 5/8	5.75	25.75	3 3/4	13
11/16	2.40	6.25	2 1/4	9	1 11/16	6.00	27.50	3 3/4	13
23/32	2.55	6.75	2 1/4	9	1 3/4	6.30	29.50	4	13 1/2
3/4	2.55	6.75	2 1/2	9 1/2	1 13/16	6.60	31.50	4	13 1/2
25/32	2.80	7.25	2 1/2	9 1/2	1 7/8	6.90	33.50	4 1/4	14
13/16	2.80	7.25	2 1/2	9 1/2	1 15/16	7.20	35.75	4 1/4	14
27/32	3.00	8.00	2 1/2	9 1/2	2	7.50	38.00	4 1/4	14
7/8	3.00	8.00	2 5/8	10					

High Speed Reamers No. 634 are not carried in stock regularly in sizes 5/8 inch and larger. We recommend "Peerless" High Speed Reamers Nos. 509 and 510, on pages 160 and 161.

All sizes and dimensions not listed are special and subject to special prices.

WHEN A CAP SCREW SNAPS SEE PAGE 174

Rose Chucking Reamers with Taper Shanks

Carbon Steel No. 151

Code Word—LANDLUBBER

High Speed Steel No. 636

Code Word- LOYAL

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
1/4	$1.45	$3.50	1 1/2	6	
9/32	1.55	3.75	1 1/2	6	
5/16	1.55	3.75	1 1/2	6	
11/32	1.75	4.25	1 1/2	6	
3/8	1.75	4.25	1 3/4	7	
13/32	1.90	4.75	1 3/4	7	
7/16	1.90	4.75	1 3/4	7	No. 1
15/32	2.15	5.25	1 3/4	7	
1/2	2.15	5.25	2	8	
17/32	2.40	5.75	2	8	
9/16	2.40	5.75	2	8	
19/32	2.70	6.25	2	8	
5/8	2.70	6.25	2 1/4	9	
21/32	2.90	6.75	2 1/4	9	
11/16	2.90	6.75	2 1/4	9	
23/32	3.05	7.25	2 1/4	9	
3/4	3.05	7.25	2 1/2	9 1/2	
25/32	3.35	8.00	2 1/2	9 1/2	No. 2
13/16	3.35	8.00	2 1/2	9 1/2	
27/32	3.60	9.00	2 1/2	9 1/2	
7/8	3.60	9.00	2 5/8	10	
29/32	3.90	10.00	2 5/8	10	

Continued on next page

High Speed Reamers No. 636 are not carried in stock regularly in sizes 5/8 inch and larger. We recommend "Peerless" High Speed Reamers Nos. 517 and 518 on pages 164 and 165.

All sizes and dimensions not listed are special and subject to special prices.

Rose Chucking Reamers with Taper Shanks

Carbon Steel No. 151

Code Word—LANDLUBBER

High Speed Steel No. 636

Code Word—LOYAL

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
15/16	$3.90	$10.00	2 5/8	10	
31/32	4.15	11.00	2 5/8	10	
1	4.15	11.00	2 3/4	10 1/2	
1 1/32	4.45	12.25	2 3/4	10 1/2	
1 1/16	4.45	12.25	2 3/4	10 1/2	
1 3/32	4.70	13.50	2 3/4	10 1/2	No. 3
1 1/8	4.70	13.50	2 7/8	11	
1 5/32	5.00	14.75	2 7/8	11	
1 3/16	5.00	14.75	2 7/8	11	
1 7/32	5.20	16.25	2 7/8	11	
1 1/4	5.20	16.25	3	11 1/2	
1 5/16	5.50	18.00	3	11 1/2	
1 3/8	5.75	19.75	3 1/4	12	
1 7/16	6.05	21.50	3 1/4	12	No. 4
1 1/2	6.30	23.25	3 1/2	12 1/2	
1 9/16	6.60	25.00	3 1/2	12 1/2	
1 5/8	6.90	26.75	3 3/4	13	
1 11/16	7.20	28.50	3 3/4	13	
1 3/4	7.55	30.50	4	13 1/2	
1 13/16	7.90	32.50	4	13 1/2	
1 7/8	8.30	34.50	4 1/4	14	No. 5
1 15/16	8.65	36.75	4 1/4	14	
2	9.00	39.00	4 1/4	14	

High Speed Reamers No. 636 are not carried in stock regularly in sizes 5/8 inch and larger. We recommend "Peerless" High Speed Reamers Nos. 517 and 518, on pages 164 and 165.

All sizes and dimensions not listed are special and subject to special prices.

WHEN A TANG TWISTS OFF, SEE PAGE 24

Taper Locomotive Reamers

Carbon Steel No. 141

Code Word—LANDFALL

High Speed Steel No. 638

Code Word—LOYALTY

(Eccentric Flutes)
Regular Taper $\frac{1}{8}$ inch per foot of length

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches
	Carbon Steel	High Speed		
1/4	$2.20	$5.00	4	5 5/16
9/32	2.20	5.20	4	5 5/16
5/16	2.25	5.40	4	5 5/16
11/32	2.25	5.60	4	5 5/16
3/8	2.30	5.80	5	6 5/16
13/32	2.40	6.00	5	6 5/16
7/16	2.55	6.20	6	7 5/16
15/32	2.70	6.40	6	7 5/16
1/2	3.00	6.60	7	8 5/8
9/16	3.20	7.10	8	9 7/8
5/8	3.50	7.60	8	9 7/8
11/16	3.80	8.25	8	9 7/8
3/4	4.10	9.00	8	9 7/8
13/16	4.50	10.00	9	11 1/4
7/8	4.80	11.00	9	11 1/4
15/16	5.10	12.00	9	11 1/4
1	5.40	13.00	9	11 1/4
1 1/16	5.70	14.50	9	11 1/4
1 1/8	6.20	16.00	10	12 1/4
1 3/16	6.60	17.50	10	12 1/4
1 1/4	7.00	19.00	10	12 1/4
1 5/16	7.60	20.75	12	14 1/2
1 3/8	8.00	22.50	12	14 1/2
1 7/16	8.50	24.50	12	14 1/2
1 1/2	9.00	26.50	12	14 1/2
1 9/16	9.60	29.00	14	16 1/2
1 5/8	10.20	31.50	14	16 1/2
1 11/16	10.85	34.00	14	16 1/2
1 3/4	11.60	36.50	14	16 1/2
1 13/16	12.40	39.00	16	18 1/2
1 7/8	14.00	42.00	16	18 1/2
1 15/16	15.00	46.00	16	18 1/2
2	16.00	50.00	16	18 1/2

High Speed Reamers No. 638 are not carried in stock regularly. All sizes, dimensions and tapers not listed are special and subject to special prices.

For ordering of Special Reamers see suggestions, page 203.

WHEN A STUD SNAPS SEE PAGE 174

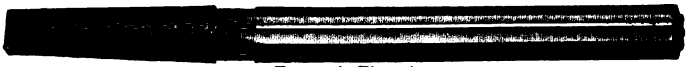
Taper Locomotive Reamers with Taper Shanks

Carbon Steel No. 157

Code Word—LANDSCEAR

High Speed Steel No. 640

Code Word—LOZENGE



(Eccentric Flutes)
Regular Taper $\frac{1}{8}$ inch per foot of length

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper
	Carbon Steel	High Speed			
1/4	$3.10	$6.00	4	7 5/16	
9/32	3.10	6.25	4	7 5/16	
5/16	3.15	6.50	4	7 5/16	
11/32	3.15	6.75	4	7 5/16	
3/8	3.20	7.00	5	8 5/16	
13/32	3.25	7.25	5	8 5/16	No. 1
7/16	3.30	7.50	6	9 5/16	
15/32	3.45	7.75	6	9 5/16	
1/2	3.50	8.00	7	10 5/16	
9/16	3.50	8.75	8	11 5/16	
5/8	4.00	9.50	8	11 11/16	
11/16	4.50	10.25	8	11 11/16	
3/4	4.90	11.00	8	11 11/16	No. 2
13/16	5.30	12.00	9	12 11/16	
7/8	5.70	13.00	9	12 11/16	
15/16	6.05	14.00	9	13 1/2	
1	6.40	15.50	9	13 1/2	
1 1/16	6.60	17.00	9	13 1/2	No. 3
1 1/8	6.80	18.50	10	14 1/2	
1 3/16	7.25	20.00	10	14 1/2	
1 1/4	7.70	22.00	10	15 5/8	
1 5/16	8.35	24.00	12	17 5/8	
1 3/8	8.80	26.00	12	17 5/8	
1 7/16	9.35	28.00	12	17 5/8	
1 1/2	9.90	30.00	12	17 5/8	No. 4
1 9/16	10.55	32.50	14	19 5/8	
1 5/8	11.20	35.00	14	19 5/8	
1 11/16	11.95	38.00	14	19 5/8	
1 3/4	12.75	41.00	14	20 7/8	
1 13/16	13.65	44.00	16	22 7/8	
1 7/8	14.60	47.00	16	22 7/8	No. 5
1 15/16	15.70	51.00	16	22 7/8	
2	16.80	55.00	16	22 7/8	

High Speed Reamers No. 640 are not carried in stock regularly.

All sizes, dimensions and tapers not listed are special and subject to special prices.

For ordering of Special Reamers see suggestions, page 203.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

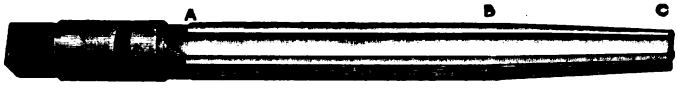
Taper Bridge Reamers with Square Shanks

Carbon Steel No. 150

Code Word—LANDLOW

High Speed Steel No. 614

Code Word—LOWEASEL



Diameter Inches			Price Each		Length of Flute Inches	Length Over All Inches
			Carbon Steel	High Speed		
A	B	C				
1/4	1/4	5/32	$2.30	$2.50	3 3/8	4 1/4
9/32	9/32	11/64	2.35	2.70	3 3/4	4 3/4
5/16	5/16	3/16	2.40	2.70	3 3/4	4 3/4
11/32	11/32	13/64	2.45	2.90	4	5 1/2
3/8	3/8	7/32	2.50	2.90	4	5 1/2
13/32	13/32	15/64	2.55	3.10	4 3/8	6 1/2
7/16	7/16	1/4	2.60	3.10	4 3/8	6 1/2
15/32	15/32	1/4	2.65	3.30	5 3/8	8 1/8
1/2	1/2	1/4	2.75	3.30	5 3/8	8 1/8
9/16	9/16	5/16	2.90	3.50	5 3/8	8 1/8
5/8	5/8	11/32	3.05	3.70	6 1/8	9 1/8
11/16	11/16	3/8	3.20	3.90	7 1/8	10 1/8
3/4	3/4	7/16	3.35	4.10	7 3/8	10 1/2
13/16	13/16	1/2	3.50	4.40	7 3/8	10 1/2
7/8	7/8	9/16	3.75	4.70	7 3/8	10 5/8
15/16	15/16	5/8	4.00	5.00	7 3/8	10 5/8
1	1	11/16	4.25	5.30	7 3/8	10 5/8
1 1/16	1 1/16	3/4	4.50	5.85	7 3/8	10 5/8
1 1/8	1 1/8	13/16	4.75	6.40	7 3/8	10 5/8
1 3/16	1 3/16	7/8	5.00	6.95	7 3/8	10 5/8
1 1/4	1 1/4	15/16	5.50	7.50	7 3/8	10 5/8
1 5/16	1 5/16	1	6.00	8.25	7 3/8	10 5/8
1 3/8	1 3/8	1 1/16	6.50	9.00	7 3/8	10 5/8
1 7/16	1 7/16	1 1/8	7.00	10.00	7 3/8	10 5/8
1 1/2	1 1/2	1 3/16	8.00	11.00	7 3/8	10 5/8

These Reamers are especially designed for severe service and particularly adapted for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not absolutely required.

High Speed Reamers No. 614 are not carried in stock regularly.

All sizes and dimensions not listed are special and subject to special prices.

WHEN A SET SCREW SNAPS SEE PAGE 174

Taper Bridge Reamers with Taper Shanks

Carbon Steel No. 150A

Code Word—LANDLOWER

High Speed Steel No. 615

Code Word—LOWEAVE

Diameter Inches A	Diameter Inches B	Diameter Inches C	Price Each Carbon Steel	Price Each High Speed	Length of Flute Inches	Length Over All Inches	Shank Taper
1/4	1/4	5/32	$2.30	$3.00	3 3/8	6 3/8	No. 1
9/32	9/32	11/64	2.35	3.25	3 3/4	6 3/4	
5/16	5/16	3/16	2.40	3.25	3 3/4	6 3/4	
11/32	11/32	13/64	2.45	3.50	4	7 1/4	
3/8	3/8	7/32	2.50	3.50	4	7 1/4	
13/32	13/32	15/64	2.55	3.75	4 3/8	8 1/4	No. 2
7/16	7/16	1/4	2.60	3.75	4 3/8	8 1/4	
15/32	15/32	1/4	2.65	4.00	5 1/8	9	
1/2	1/2	1/4	2.75	4.00	5 1/8	9	
9/16	9/16	5/16	2.90	4.25	5 1/8	9	
5/8	5/8	11/32	3.05	4.50	6 1/8	10	
11/16	11/16	3/8	3.20	4.75	7 1/8	11 3/4	No. 3
3/4	3/4	7/16	3.35	5.00	7 3/8	12	
13/16	13/16	1/2	3.50	5.30	7 3/8	12	
7/8	7/8	9/16	3.75	5.70	7 3/8	12	
15/16	15/16	5/8	4.00	6.00	7 3/8	12	
1	1	11/16	4.25	6.50	7 3/8	12	
1 1/16	1 1/16	3/4	4.50	7.00	7 3/8	12	
1 1/8	1 1/8	13/16	4.75	7.50	7 3/8	12	
1 3/16	1 3/16	7/8	5.00	8.00	7 3/8	12	
1 1/4	1 1/4	15/16	5.50	8.75	7 3/8	13	No. 4
1 5/16	1 5/16	1	6.00	9.50	7 3/8	13	
1 3/8	1 3/8	1 1/16	6.50	10.50	7 3/8	13	
1 7/16	1 7/16	1 1/8	7.00	12.00	7 3/8	13	
1 1/2	1 1/2	1 3/16	8.00	14.00	7 3/8	13	

These Reamers are especially designed for severe service and particularly adapted for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not absolutely required.

All sizes and dimensions not listed are special and subject to special prices.

WHY DO TANGS BREAK? SEE PAGE 97

No. 137—Standard Taper Pin Reamers

For Code Words See Page 236

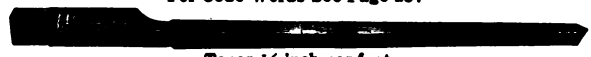
Taper ¼ inch per foot

Size No.	Price Each	Diameter at Small End Inches	Length of Flute Inches	Length Over All Inches
000	$1.50	.101	1 3/16	2
00	1.35	.114	1 1/16	2 1/4
0	1.00	.127	1 5/16	2 3/8
1	1.00	.146	1 3/4	2 1/2
2	1.25	.162	2	3
3	1.50	.183	2 1/4	3 1/2
4	1.75	.208	2 1/2	4
5	2.00	.240	3	4 1/2
6	2.25	.279	3 5/16	5
7	2.50	.331	4 1/2	6
8	3.00	.398	5 1/4	6 3/4
9	3.50	.482	6 1/8	8
10	4.50	.581	7	9
11	6.00	.706	8 1/4	11 1/4
12	7.50	.842	10	13 3/4
13	9.00	1.009	12	16
14	11.00	1.250	14	18 1/4

These Reamers are all of the same taper and the point of each Reamer will enter the hole reamed by the next size smaller.

No. 138—Half-Round Taper Pin Reamers

For Code Words See Page 237



Taper ¼ inch per foot

Size No.	Price Each	Diameter at Small End Inches	Length of Flute Inches	Length Over All Inches
000	$1.50	.101	1 3/16	2
00	1.35	.114	1 1/16	2 1/4
0	1.00	.127	1 5/16	2 3/8
1	1.00	.146	1 3/4	2 1/2
2	1.25	.162	2	3
3	1.50	.183	2 1/4	3 1/2
4	1.75	.208	2 1/2	4
5	2.00	.240	3	4 1/2
6	2.25	.279	3 5/16	5
7	2.50	.331	4 1/2	6
8	3.00	.398	5 1/4	6 3/4
9	3.50	.482	6 1/8	8
10	4.50	.581	7	9
11	6.00	.706	8 1/4	11 1/4
12	7.50	.842	10	13 3/4
13	9.00	1.009	12	16
14	11.00	1.250	14	18 1/4

These Reamers are all of the same taper and the point of each Reamer will enter the hole reamed by the next size smaller.

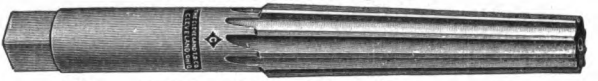
All sizes, dimensions and tapers not listed are special and subject to special prices.

WHEN A CAP SCREW SNAPS SEE PAGE 174

Taper Socket Reamers

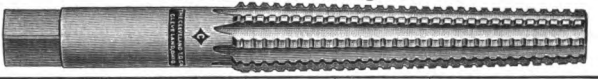
No. 144—Finishing Reamers

For Code Words See Page 237



No. 144A—Roughing Reamers

For Code Words See Page 237



Number of Taper	Price Each		Length of Flute Inches	Length Over All Inches	Diameters at	
	Finishing	Roughing			Large End Inches	Small End Inches
0	$1.60	$1.90	2¼	3¾	.369	.252
1	2.00	2.40	3	5½	.519	.369
2	2.60	3.10	3½	7	.748	.572
3	3.40	4.10	4¼	8	.991	.778
4	4.20	5.05	5¼	9	1.293	1.020
5	6.60	7.90	6¼	10	1.803	1.475
6	12.00	14.40	8½	12	2.559	2.116
7	35.00	42.00	12	16	3.375	2.750

No. 144B—Finishing Reamers

For Code Words See Page 237

No. 144C—Roughing Reamers

For Code Words See Page 237

Number of Taper	Price Each		Length of Flute Inches	Length Over All Inches	Diameter at		Number of Morse Taper Shank
	Finishing	Roughing			Large End Inches	Small End Inches	
0	$2.65	$3.20	2¼	5 9/32	.369	.252	0
1	2.95	3.55	3	6 5/16	.519	.369	1
2	3.25	3.90	3½	7 5/16	.748	.572	2
3	4.45	5.35	4¼	8 13/16	.991	.778	3
4	6.00	7.20	5¼	11	1.293	1.020	4
5	10.10	12.10	6¼	13¼	1.803	1.475	5
6	21.35	25.60	8½	17 7/8	2.559	2.116	6
7	37.50	45.00	12	21 3/8	3.375	2.750	6

All sizes, dimensions and tapers not listed are special and subject to special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 137A—Bit Stock Taper Reamers

Code Word—LANDBEAM

Size Inches	Price Each	Length of Flute Inches	Length Over All Inches	Size Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/4	$0.60	1 7/8	4 1/4	11/16	$1.10	3	5 11/16
5/16	.60	2	4 1/2	3/4	1.25	3 1/8	6 1/4
3/8	.65	2 1/8	4 3/4	13/16	1.50	3 1/8	6 1/4
7/16	.70	2 1/4	4 11/16	7/8	1.75	3 1/2	6 11/16
1/2	.75	2 9/16	5 5/16	15/16	2.00	3 1/2	6 11/16
9/16	.80	2 11/16	5 9/16	1	2.25	4	7 1/4
5/8	.95	2 3/4	5 11/16				

These Reamers have a taper approximating 3/4 inch to the foot. They are about 1/16 inch larger at the large end than the size stamped on the shank and the point of each reamer will enter the hole reamed by the next size smaller.

No. 155A—Four-Fluted Chucking Reamers with Taper Shanks

Code Word—LANDSCAST

These Reamers have the same dimensions and list prices as the Three-Fluted Chucking Reamers on the two following pages.

No. 161A—Four-Fluted Chucking Reamers with Straight Shanks

Code Word—LANDSCOT

Three and Four-Fluted Chucking Reamers are specially designed for enlarging cored or drilled holes. They are ground to size on centers, and except where extremely fine accuracy is desired, they need not be followed by a finishing reamer.

Reamers of special lengths or of high speed steel will be made to order at special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Three-Fluted Chucking Reamers with Taper Shanks

Carbon Steel No. 155

Code Word—LANDSCAPE

High Speed Steel No. 642

Code Word—LUBBER

Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper
1/4	$1.70	$4.00	6 1/8	
9/32	1.70	4.25	6 1/4	
5/16	1.70	4.25	6 3/8	
11/32	1.70	4.75	6 1/2	
3/8	1.70	4.75	6 3/4	
13/32	1.75	5.25	7	No. 1
7/16	1.80	5.25	7 1/4	
15/32	1.85	5.75	7 1/2	
1/2	1.90	5.75	7 3/4	
17/32	1.95	6.25	8	
9/16	2.00	6.25	8 1/4	
19/32	2.30	6.75	8 1/2	
5/8	2.60	6.75	8 3/4	
21/32	2.70	7.25	9	
11/16	2.75	7.25	9 1/4	
23/32	2.85	7.75	9 1/2	
3/4	2.90	7.75	9 3/4	No. 2
25/32	3.00	8.50	9 7/8	
13/16	3.05	8.50	10	
27/32	3.15	9.50	10 1/4	
7/8	3.20	9.50	10 1/2	
29/32	3.30	10.50	10 5/8	
15/16	3.40	10.50	10 3/4	
31/32	3.50	11.50	10 7/8	
1	3.60	11.50	11	No. 3
1 1/32	3.70	12.50	11 1/8	
1 1/16	3.80	12.50	11 1/4	
1 3/32	3.90	13.75	11 1/2	
1 1/8	$4.00	$13.75	11 3/4	
1 5/32	4.25	15.25	11 7/8	
1 3/16	4.50	15.25	12	No. 3
1 7/32	4.65	16.75	12 1/8	
1 1/4	4.80	16.75	12 1/2	
1 9/32	5.00	18.25	14 1/8	
1 5/16	5.20	18.25	14 1/4	
1 11/32	5.40	19.75	14 3/8	
1 3/8	5.60	19.75	14 1/2	
1 13/32	5.80	21.50	14 5/8	
1 7/16	6.00	21.50	14 3/4	
1 15/32	6.20	23.25	14 7/8	
1 1/2	6.40	23.25	15	No. 4
1 17/32	6.65	25.00	15 1/8	
1 9/16	6.90	25.00	15 1/4	
1 19/32	7.15	26.75	15 3/8	
1 5/8	7.40	26.75	15 1/2	
1 21/32	7.65	28.50	15 5/8	
1 11/16	7.90	28.50	15 3/4	
1 23/32	8.15	30.50	15 7/8	
1 3/4	8.40	30.50	16	
1 25/32	8.60	32.50	16 1/8	
1 13/16	8.80	32.50	16 1/4	
1 27/32	9.00	34.50	16 3/8	
1 7/8	9.20	34.50	16 1/2	No. 5
1 29/32	9.35	36.75	16 1/2	
1 15/16	9.50	36.75	16 1/2	
1 31/32	9.65	39.00	16 1/2	
2	9.80	39.00	16 1/2	

See foot-note on previous page.

High Speed Reamers No. 642 are not carried in stock regularly.

All sizes and dimensions not listed are special and subject to special prices.

ELIMINATE BROKEN TANGS—SEE PAGE 23

Three-Fluted Chucking Reamers with Straight Shanks

Carbon Steel No. 161

Code Word—LANDSCOUR

High Speed Steel No. 644

Code Word—LUBBERLAND

Diameter Inches	Price Each		Length Over All Inches	Diameter Inches	Price Each		Length Over All Inches
	Carbon Steel	High Speed			Carbon Steel	High Speed	
1/4	$1.70	$4.00	6 1/8	1 5/32	$4.25	$15.25	11 7/8
9/32	1.70	4.25	6 1/4	1 3/16	4.50	15.25	12
5/16	1.70	4.25	6 3/8	1 7/32	4.65	16.75	12 1/8
11/32	1.70	4.75	6 1/2	1 1/4	4.80	16.75	12 1/2
3/8	1.70	4.75	6 3/4	1 9/32	5.00	18.25	14 1/8
13/32	1.75	5.25	7	1 5/16	5.20	18.25	14 1/4
7/16	1.80	5.25	7 1/4	1 11/32	5.40	19.75	14 3/8
15/32	1.85	5.75	7 1/2	1 3/8	5.65	19.75	14 1/2
1/2	1.90	5.75	7 3/4	1 13/32	5.80	21.50	14 5/8
17/32	1.95	6.25	8	1 7/16	6.00	21.50	14 3/4
9/16	2.00	6.25	8 1/4	1 15/32	6.20	23.25	14 7/8
19/32	2.30	6.75	8 1/2	1 1/2	6.40	23.25	15
5/8	2.60	6.75	8 3/4	1 17/32	6.65	25.00	15 1/8
21/32	2.70	7.25	9	1 9/16	6.90	25.00	15 1/4
11/16	2.75	7.25	9 1/4	1 19/32	7.15	26.75	15 3/8
23/32	2.85	7.75	9 1/2	1 5/8	7.40	26.75	15 1/2
3/4	2.90	7.75	9 3/4	1 21/32	7.65	28.50	15 5/8
25/32	3.00	8.50	9 7/8	1 11/16	7.90	28.50	15 3/4
13/16	3.05	8.50	10	1 23/32	8.15	30.50	15 7/8
27/32	3.15	9.50	10 1/4	1 3/4	8.40	30.50	16
7/8	3.20	9.50	10 1/2	1 25/32	8.60	32.50	16 1/8
29/32	3.30	10.50	10 5/8	1 13/16	8.80	32.50	16 1/4
15/16	3.40	10.50	10 3/4	1 27/32	9.00	34.50	16 3/8
31/32	3.50	11.50	10 7/8	1 7/8	9.20	34.50	16 1/2
1	3.60	11.50	11	1 29/32	9.35	36.75	16 1/2
1 1/32	3.70	12.50	11 1/8	1 15/16	9.50	36.75	16 1/2
1 1/16	3.80	12.50	11 1/4	1 31/32	9.65	39.00	16 1/2
1 3/32	3.90	13.75	11 1/2	2	9.80	39.00	16 1/2
1 1/8	4.00	13.75	11 3/4				

See foot-note on page 134.

High Speed Reamers No. 644 are not carried in stock regularly.

All sizes and dimensions not listed are special and subject to special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Hand Reamers for Ford Bushings

Hand Reamers Numbers 132 and 135, illustrated below, are newcomers to the "Cleveland" catalog, although they have held a popular place in our line for some time past. They will be found of great assistance for speedy and accurate work in renewing the worn bushings of Ford Automobile steering spindle bodies and arms.

In their design, the convenience of the user and the requirements of the work have been given careful consideration. Measuring .5075" at their small diameter and $\frac{9}{16}$ at the large, either the spiral or straight fluted styles will handle the bushings of either the spindle body or arm—thus, in effect, giving two reamers in one. The length of the small diameter is sufficient to span and ream both spindle body bushings at one operation. This feature insures exact alignment of these important parts. Furnished with either straight or spiral flutes.

No. 132—Straight Fluted Hand Reamer

Code Word—LAMENT

Price, $2.00

Reamers for brass or bronze require special clearance and are so furnished on request.

No. 135—Spiral Fluted Hand Reamer

Code Word—LANCEPOD

Price, $2.40

Reamers for brass or bronze require special clearance and are so furnished on request.

WHEN A SET SCREW SNAPS SEE PAGE 174

No. 30 Set—Taper Pin Reamers

Code Word—PARLEAPT

This set was specially designed for the automobile kit. It consists of the following sizes of Taper Pin Reamers:

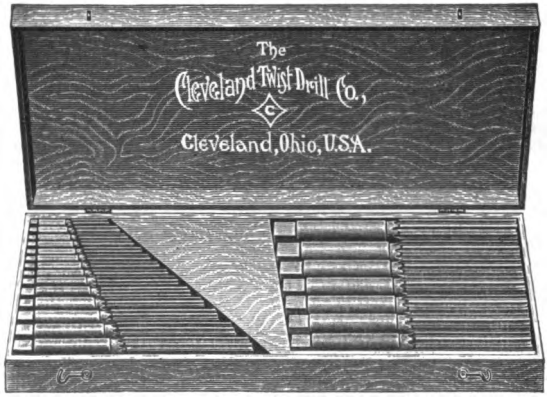
0, 1, 2, 3, 4, 5.

They are put up in a round wooden box, five inches high by two in diameter, handsomely finished in dark maroon.

Price complete, **$9.50**

PRICES OF REAMERS IN SETS

For Code Words See Page 10



Cut shows Set No. 27C, comprising Hand Reamers from ¼ to 1½ inch by 16ths. The cases are of oak, finely polished. Each tool has its own groove, thus preventing any injury by contact, and making selection easy.

No. 27A	**Set—Hand Reamers,**		**¼ to 1**	**inch by**	**16ths,**	**in case, complete,**			**$33.00**
No. 27B	"	"	**¼ to 1¼**	"	**16ths,**	"	"	"	**53.00**
No. 27C	"	"	**¼ to 1½**	"	**16ths,**	"	"	"	**78.50**
No. 27D	"	"	**¼ to 2**	"	**16ths,**	"	"	"	**150.00**
No. 27E	"	"	**¼ to 1**	"	**32nds,**	"	"	"	**64.00**
No. 27F	"	"	**¼ to 1¼**	"	**32nds,**	"	"	"	**102.50**
No. 27G	"	"	**¼ to 1½**	"	**32nds,**	"	"	"	**153.00**
No. 27H	"	"	**¼ to 2**	"	**32nds,**	"	"	"	**295.00**
No. 31 Set—Taper Pin		"	**Nos. 0 to 10, inclusive,**			"	"	"	**26.50**
No. 32 Set—Socket		"	**Nos. 1 to 5,**			"	"	"	**20.50**

No. 33 Set—Bit Stock Taper Reamers ¼ to ¾ inch by 16ths, in case, complete **8.25**

ALWAYS SPECIFY "SET" WHEN ORDERING

SPECIAL REAMERS

Expansion Reamer, with Extra Long Shank

Hand Reamer, Extra Long

(Eccentric Flutes)

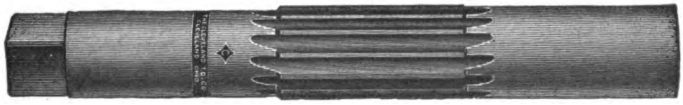
Taper Shank, Spiral Flute, Finishing Reamer

Taper Shank, Spiral Flute, Roughing Reamer

Hand Reamer, Spiral Fluted, Extra Long

Hand Reamer, with Pilot

(Eccentric Flutes)



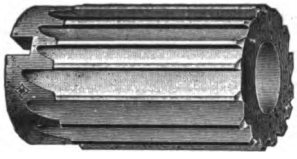
We make to order a large number of Special Reamers to meet varying needs; our long experience, with our large and well equipped plant, enabling us to give valuable service in making suggestions or in working out designs.

When ordering or desiring quotations on Special Reamers, please refer to page 203 for information ordinarily required.

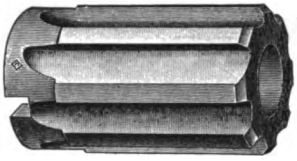
REAMING? IT WILL PAY YOU TO READ PAGE 154

Millimeter Size Reamers

No. 1130
Fluted Shell Reamers
Code Word—LAGIDE



No. 1131
Rose Shell Reamers
Code Word—LAGIFT



Diameter m/m	Price Each	Size Hole m/m	Length Over All m/m	Fitting Arbor	Diameter m/m	Price Each	Size Hole m/m	Length Over All m/m	Fitting Arbor
13	$1.70	6.35	51		42	$5.10	25.40	89	
14	1.80	6.35	51		43	5.10	25.40	89	
15	1.90	6.35	51	No. 3	44	5.40	25.40	89	
16	1.90	6.35	51		45	5.70	25.40	89	
17	2.00	9.50	57		46	5.70	25.40	89	No. 8
18	2.10	9.50	57	No. 4	47	6.00	25.40	89	
19	2.10	9.50	57		48	6.00	25.40	89	
20	2.20	12.70	63		49	6.30	25.40	89	
21	2.20	12.70	63		50	6.60	25.40	89	
22	2.30	12.70	63		51	6.60	31.75	95	
23	2.40	12.70	63	No. 5	52	6.95	31.75	95	
24	2.40	12.70	63		53	6.95	31.75	95	
25	2.50	12.70	63		54	7.30	31.75	95	
26	2.70	15.87	70		55	7.65	31.75	95	
27	2.70	15.87	70		56	7.65	31.75	95	
28	2.90	15.87	70		57	8.00	31.75	95	No. 9
29	3.10	15.87	70	No. 6	58	8.35	31.75	95	
30	3.10	15.87	70		59	8.35	31.75	95	
31	3.30	15.87	70		60	8.70	31.75	95	
32	3.30	19.05	76		61	8.70	31.75	95	
33	3.55	19.05	76		62	9.05	31.75	95	
34	3.80	19.05	76		63	9.40	31.75	95	
35	3.80	19.05	76		64	9.40	38.10	101½	
36	4.05	19.05	76		65	9.80	38.10	101½	
37	4.30	19.05	76	No. 7	66	10.20	38.10	101½	
38	4.30	19.05	76		67	10.20	38.10	101½	No. 10
39	4.55	19.05	76		68	10.60	38.10	101½	
40	4.55	19.05	76		69	10.60	38.10	101½	
41	4.80	19.05	76		70	11.00	38.10	101½	

Reamers for brass or bronze require special clearance and are so furnished on request. All sizes and dimensions not listed are special and subject to special prices. For Shell Reamer Arbors, see pages 104, 105 and 180. Shell Reamers have taper holes, the size given being at the large end.

"PEERLESS" REAMERS REDUCE REAMING COSTS

Millimeter Size Reamers
No. 1196—Hand Reamers
Code Word—LAPASCO

(Eccentric Flutes)

Diameter ⁄	Price Each	Length of Flute ⁄	Length Over All ⁄	Diameter ⁄	Price Each	Length of Flute ⁄	Length Over All ⁄
3	$1.00	38	76	23	$3.25	128	256
3½	1.10	41	82	23½	3.35	130	260
4	1.10	41	82	24	3.40	130	260
4½	1.20	44	89	24½	3.55	136	272
5	1.25	47	95	25	3.60	138	276
5½	1.30	47	95	26	3.80	140	281
6	1.40	51	102	27	4.00	143	286
6½	1.40	51	102	28	4.25	147	295
7	1.45	54	108	29	4.45	150	300
7½	1.50	57	115	30	4.60	152	305
8	1.50	57	115	31	4.75	154	308
8½	1.55	60	121	32	4.90	157	314
9	1.60	63	127	33	5.15	158	316
9½	1.60	63	127	34	5.40	159	318
10	1.70	66	133	35	5.60	160	321
10½	1.70	66	133	36	5.90	162	325
11	1.75	70	140	37	6.15	164	328
11½	1.85	73	146	38	6.40	165	330
12	1.85	73	146	39	6.60	165	330
12½	1.90	76	152	40	6.90	165	330
13	1.95	79	158	41	7.20	165	330
13½	1.95	79	158	42	7.40	171	343
14	2.00	82	165	43	7.60	171	343
14½	2.10	86	171	44	7.90	171	343
15	2.10	86	171	45	8.10	171	343
15½	2.20	89	178	46	8.40	171	343
16	2.20	89	178	47	8.60	171	343
16½	2.30	93	187	48	8.90	178	356
17	2.40	98	196	49	9.20	178	356
17½	2.40	98	196	50	9.40	178	356
18	2.50	103	206	51	9.70	178	356
18½	2.60	106	213	52	10.00	184	368
19	2.60	106	213	53	10.20	184	368
19½	2.70	111	222	54	10.40	184	368
20	2.75	111	222	55	10.70	190	381
20½	2.80	115	230	56	11.00	190	381
21	2.90	119	238	57	11.30	190	381
21½	3.00	119	238	58	11.60	190	381
22	3.10	123	246	59	12.00	190	381
22½	3.20	128	256	60	12.30	190	381

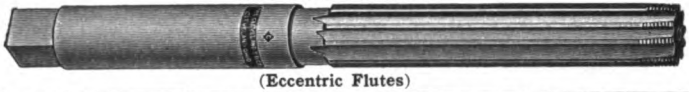
See Foot Notes on Page 142.

WHEN A CAP SCREW SNAPS SEE PAGE 174

Millimeter Size Reamers

No. 1193—Cleveland Self-Feeding Reamers

Code Word—LAPARIUM



(Eccentric Flutes)

Diameter m/m	Price Each	Length of Flute m/m	Length Over All m/m	Diameter m/m	Price Each	Length of Flute m/m	Length Over All m/m
5	$1.40	47	95	24	$3.75	130	260
5½	1.45	47	95	24½	3.90	136	272
6	1.55	51	102	25	3.95	138	276
6½	1.55	51	102	26	4.20	140	281
7	1.60	54	108	27	4.40	143	286
7½	1.65	57	115	28	4.70	147	295
8	1.65	57	115	29	4.90	150	300
8½	1.70	60	121	30	5.05	152	305
9	1.75	63	127	31	5.25	154	308
9½	1.75	63	127	32	5.40	157	314
10	1.85	66	133	33	5.65	158	316
10½	1.85	66	133	34	5.95	159	318
11	1.95	70	140	35	6.15	160	321
11½	2.05	73	146	36	6.50	162	325
12	2.05	73	146	37	6.75	164	328
12½	2.10	76	152	38	7.05	165	330
13	2.15	79	158	39	7.25	165	330
13½	2.15	79	158	40	7.60	165	330
14	2.20	82	165	41	7.90	165	330
14½	2.30	86	171	42	8.15	171	343
15	2.30	86	171	43	8.35	171	343
15½	2.40	89	178	44	8.70	171	343
16	2.40	89	178	45	8.90	171	343
16½	2.55	93	187	46	9.25	171	343
17	2.65	98	196	47	9.45	171	343
17½	2.65	98	196	48	9.80	178	356
18	2.75	103	206	49	10.10	178	356
18½	2.85	106	213	50	10.35	178	356
19	2.85	106	213	51	10.65	178	356
19½	2.95	111	222	52	11.00	184	368
20	3.05	111	222	53	11.20	184	368
20½	3.10	115	230	54	11.45	184	368
21	3.20	119	238	55	11.75	190	381
21½	3.30	119	238	56	12.10	190	381
22	3.40	123	246	57	12.45	190	381
22½	3.50	128	256	58	12.75	190	381
23	3.60	128	256	59	13.20	190	381
23½	3.70	130	260	60	13.55	190	381

Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Millimeter Size Reamers

No. 1129—Common Sense Expansion Reamers

Code Word—LAGHOST

(Eccentric Flutes)

Limits of expansion recommended for these reamers are as follows: Sizes 6 to 12 m/m, .005 inch; 13 to 25 m/m, .008 inch; 26 to 44 m/m, .010 inch; 45 to 50 m/m, .012 inch. The pilots on these reamers are ground slightly undersize. Reamers for brass or bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

Diameter m/m	Price Each	Length Over All m/m	Diameter m/m	Price Each	Length Over All m/m
6	$3.00	95	29	$8.00	235
7	3.05	98	30	8.30	243
8	3.15	102	31	8.90	247
9	3.20	105	32	9.20	251
10	3.25	111	33	9.50	254
11	3.30	114	34	10.00	257
12	3.40	121	35	11.00	263
13	3.50	127	36	11.50	267
14	3.65	136	37	12.00	270
15	3.80	141	38	12.50	273
16	4.20	146	39	13.00	283
17	4.40	152	40	13.25	283
18	4.60	159	41	13.50	286
19	4.80	168	42	13.75	286
20	5.25	175	43	14.25	292
21	5.50	181	44	14.50	292
22	5.75	192	45	14.75	298
23	6.00	198	46	15.00	298
24	6.50	205	47	15.50	298
25	6.75	210	48	15.75	298
26	7.00	216	49	16.00	305
27	7.25	229	50	16.25	305
28	7.75	232			

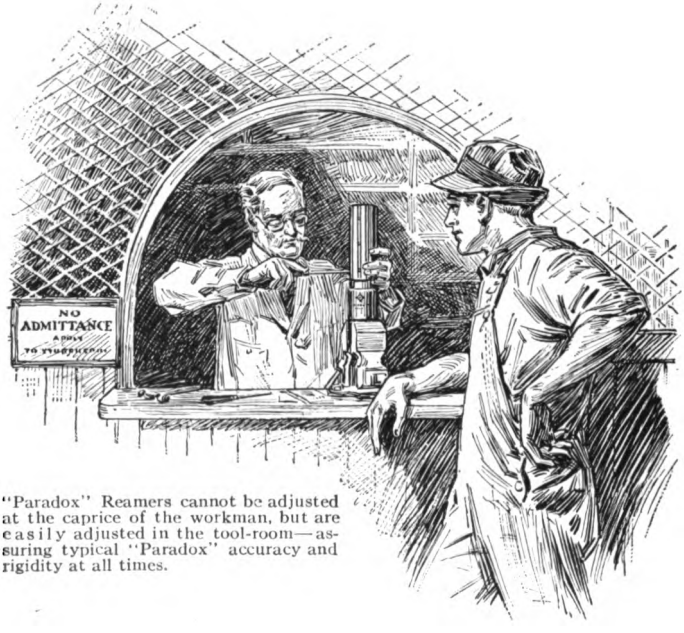
Millimeter Size Bridge Reamers

Any of our regularly listed Reamers and special styles not listed, will be furnished in millimeter sizes on short notice. We will gladly quote prices on receiving your specifications.

ADJUSTABLE YET SOLID—IT'S A "PARADOX"

"Paradox" Reamers

"Adjustable Yet Solid"



"Paradox" Reamers cannot be adjusted at the caprice of the workman, but are easily adjusted in the tool-room—assuring typical "Paradox" accuracy and rigidity at all times.

Detailed Index—Pages 4 to 17

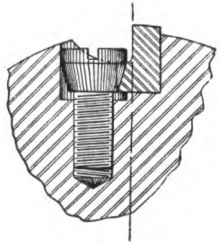
"Paradox" Adjustable Reamers

General Construction

"Paradox" Adjustable Reamers have a body of tough machinery steel, case-hardened where subject to wear, into which are inserted blades of finely tempered tool steel.

Adjustable, yet Solid

The section drawing shows the simple, yet effective method of supporting the blades. Taper-headed screws wedge them firmly against their backing, the blades being countersunk at intervals along the shoulder at their base to fit the taper screw-heads. One of the screws is placed as near the end of the blade as possible, giving firm support where it is most needed—close to the cutting edge—and effectively preventing the tool from "hogging in." This construction gives all the *rigidity of a solid reamer.*



Making Adjustments

To make adjustments, loosen the screws, remove one or more blades and insert tinfoil, or some other similar substance, in the grooves, screwing down the blades on top of it. Adjustments ranging from .0005 to $\frac{3}{32}$nd inch may be had in the case of 3-inch reamers, the range being less, of course, for the smaller sizes and somewhat greater for the larger reamers—we can supply tinfoil .0005 and .001 inch thick for this purpose. If more adjustment is required than one thickness of tinfoil additional layers may be added, but care should be taken to see that it is *even and free from wrinkles* the full length of the blade.

Caution

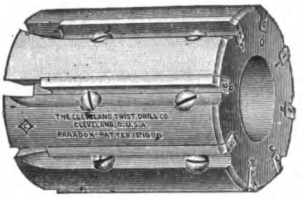
As the flutes of "Paradox" Reamers are eccentrically milled, each blade *must* be replaced in the groove numbered to correspond with the figures on the end of the blade.

New Blades

We can furnish additional blades from stock on short notice. When ordering them give the numbers of the body grooves in which they are to go, with the size and list number of the tool—if an entire new set is wanted the size and list number of the tool will be sufficient.

In Service

Testimony of our customers seems to show that a single "Paradox" Reamer with its original outfit of blades will ream as many accurate holes to a standard gauge as from eight to ten solid reamers.



(Eccentric Flutes)

No. 301—"Paradox" Adjustable Shell Reamers

Code Word—LEADER

Patented February 15, 1898

Diameter Inches	Price Each	Size Hole Inches	Length of Blade Inches	Length Over All Inches	Fitting Arbor
1 3/8	$6.35	1/2	2	2 1/2	
1 7/16	6.90	1/2	2	2 1/2	No. 5-7
1 1/2	7.40	1/2	2	2 1/2	Page 149
1 9/16	7.60	1/2	2	2 1/2	
1 5/8	7.80	5/8	2 1/4	2 3/4	
1 11/16	8.00	5/8	2 1/4	2 3/4	No. 6-7 1/2
1 3/4	8.15	5/8	2 1/4	2 3/4	Page 149
1 13/16	8.35	3/4	2 1/2	3	
1 7/8	8.50	3/4	2 1/2	3	
1 15/16	8.70	3/4	2 1/2	3	
2	8.85	3/4	2 1/2	3	No. 7-8
2 1/16	9.00	3/4	2 1/2	3	Page 149
2 1/8	9.25	3/4	2 1/2	3	
2 3/16	9.50	3/4	2 1/2	3	
2 1/4	9.70	3/4	2 1/2	3	
2 5/16	10.00	1	2 3/4	3 1/2	
2 3/8	10.25	1	2 3/4	3 1/2	
2 7/16	10.50	1	2 3/4	3 1/2	No. 8-9
2 1/2	10.75	1	2 3/4	3 1/2	Page 149
2 9/16	11.00	1	2 3/4	3 1/2	
2 5/8	11.50	1	2 3/4	3 1/2	
2 11/16	12.00	1 1/4	3	3 3/4	
2 3/4	12.50	1 1/4	3	3 3/4	
2 13/16	13.00	1 1/4	3	3 3/4	
2 7/8	13.50	1 1/4	3	3 3/4	No. 9-10
2 15/16	14.00	1 1/4	3	3 3/4	Page 149
3	14.50	1 1/4	3	3 3/4	
3 1/16	15.00	1 1/4	3	3 3/4	
3 1/8	15.50	1 1/4	3	3 3/4	
3 3/16	16.00	1 1/2	3 1/4	4	
3 1/4	16.50	1 1/2	3 1/4	4	
3 5/16	17.00	1 1/2	3 1/4	4	No. 10
3 3/8	17.50	1 1/2	3 1/4	4	
3 7/16	18.00	1 1/2	3 1/4	4	
3 1/2	18.50	1 1/2	3 1/4	4	
3 9/16	19.00	1 3/4	3 1/2	4 1/2	No. 11
3 5/8	19.50	1 3/4	3 1/2	4 1/2	

Arbors for "Paradox" Reamers up to 3 1/8 inches on page 149. Other "Paradox" Arbors on page 150.

Shell Reamers have taper holes, the diameter given being at the large end.

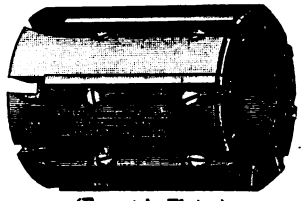
BLADES COST LESS THAN REAMERS. SEE PAGE 154

No. 301—"Paradox" Adjustable Shell Reamers

(Continued)

Code Word—LEADER

Patented February 15, 1898



(Eccentric Flutes)

Diameter Inches	Price Each	Size Hole Inches	Length of Blade Inches	Length Over All Inches	Fitting Arbor
3 11/16	$20.00	1¾	3½	4½	No. 11
3¾	20.50	1¾	3½	4½	
3 13/16	21.00	1¾	3½	4½	
3⅞	21.50	1¾	3½	4½	
3 15/16	22.00	2	4	5	No. 12
4	22.50	2	4	5	
4 1/16	23.00	2	4	5	
4⅛	23.50	2	4	5	
4 3/16	24.00	2	4	5	
4¼	24.50	2	4	5	
4 5/16	25.00	2¼	4½	5½	No. 13
4⅜	25.50	2¼	4½	5½	
4 7/16	26.00	2¼	4½	5½	
4½	26.50	2¼	4½	5½	
4 9/16	27.00	2½	5	6	No. 14
4⅝	27.50	2½	5	6	
4 11/16	28.00	2½	5	6	
4¾	28.50	2½	5	6	
4 13/16	29.00	2½	5	6	
4⅞	29.50	2½	5	6	
4 15/16	30.00	2½	5	6	
5	30.50	2½	5	6	
5 1/16	30.80	2½	5	6	
5⅛	31.20	2½	5	6	
5 3/16	31.60	2½	5	6	
5¼	32.00	2½	5	6	
5 5/16	32.50	2½	5	6	
5⅜	33.00	2½	5	6	
5 7/16	33.50	2½	5	6	
5½	34.00	2½	5	6	
5 9/16	34.50	2¾	5½	6½	No. 15
5⅝	35.00	2¾	5½	6½	
5 11/16	35.50	2¾	5½	6½	
5¾	36.00	2¾	5½	6½	
5 13/16	36.50	2¾	5½	6½	
5⅞	37.00	2¾	5½	6½	
5 15/16	37.50	2¾	5½	6½	
6	38.00	2¾	5½	6½	

Shell Reamers have taper holes, the diameter given being at the large end. Arbors for "Paradox" Shell Reamers over 3 1/8" in diameter on page 150.

DOUBLE PRODUCTION PER DOLLAR—PAGE 154

Patent Arbors for "Paradox" Shell Reamers Up to 3⅛ Inches in Diameter

(Patented Dec. 15th, 1908)

REGULAR arbors small enough to go into "Paradox" Shell Reamers up to 3⅛ inches in diameter have frequently been found lacking in requisite strength in the collar and shank. To overcome this difficulty, we have designed special arbors Nos. 335 and 336, with extra heavy collars and bodies.

Their construction is very similar to that of the Patent Arbors shown on pages 111 and 198. The collar is movably attached to the body, into which the driving keys, integral with the collar are longitudinally mortised. The collar, after loosening the set-screw which secures it to the body, may be driven along the body in such a way as to release any tight-fitting shell tool without damaging it.

In the lists on the following page, the figure preceding the hyphen in the "Size No." column denotes the standard size of the Arbor-part proper, while the figure following the hyphen indicates the arbor size to which the dimensions of the rest of the tool approximately correspond.

These are the only arbors we can recommend for use with "Paradox" Shell Reamers up to 3⅛ inches diameter.

Patent Arbors for "Paradox" Shell Reamers Up to 3 1/8 Inches in Diameter

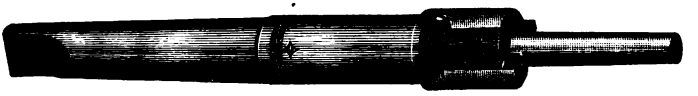
No. 335—Straight Shank

(Patented Dec. 15th, 1908)

Size No.	Price Each	Fitting Sizes of Paradox Reamers Inches	Length Over All Inches	Code Word
5–7	$4.50	1 3/8 to 1 9/16	10	Prate
6–7 1/2	4.95	1 37/64 to 1 3/4	11	Pratique
7–8	5.40	1 49/64 to 2 1/4	12	Pratt
8–9	6.00	2 17/64 to 2 5/8	13	Prattle
9–10	6.75	2 41/64 to 3 1/8	14	Pravity

These are the only Arbors we can recommend for use with "Paradox" Shell Reamers up to 3 1/8 inches diameter.

No. 336—Taper Shank



(Patented Dec. 15th, 1908)

Size No.	Price Each	Fitting Sizes of Paradox Reamers Inches	Length Over All Inches	Taper Shank	Code Word
5–7	$5.40	1 3/8 to 1 9/16	10	No. 3	Prawn
6–7 1/2	5.95	1 37/64 to 1 3/4	11	No. 4	Praxis
7–8	6.50	1 49/64 to 2 1/4	12		Pray
8–9	7.20	2 17/64 to 2 5/8	13	No. 5	Prayer
9–10	8.10	2 41/64 to 3 1/8	14		Prayerful

These are the only Arbors we can recommend for use with "Paradox" Shell Reamers up to 3 1/8 inches diameter.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Arbors for "Paradox" Shell Reamers Over 3⅛ Inches in Diameter

No. 133—Straight Shank Arbors

For Code Words See Page 236

Size No.	Price Each	Fitting Sizes Inches	Length Over All Inches
10	$5.25	$3\frac{9}{64}$ to $3\frac{1}{2}$	14
11	7.50	$3\frac{33}{64}$ to $3\frac{7}{8}$	15
12	10.50	$3\frac{57}{64}$ to $4\frac{1}{4}$	16
13	13.50	$4\frac{17}{64}$ to $4\frac{1}{2}$	17
14	18.00	$4\frac{33}{64}$ to $5\frac{1}{2}$	18
15	22.00	$5\frac{33}{64}$ to 6	19

These Arbors are regular in all respects

No. 133A—Taper Shank Arbors

For Code Words See Page 236

Size No.	Price Each	Fitting Sizes Inches	Length Over All Inches	Shank Taper
10	$6.30	$3\frac{9}{64}$ to $3\frac{1}{2}$	14	
11	9.00	$3\frac{33}{64}$ to $3\frac{7}{8}$	15	
12	12.60	$3\frac{57}{64}$ to $4\frac{1}{4}$	16	No. 5
13	16.20	$4\frac{17}{64}$ to $4\frac{1}{2}$	17	
14	21.60	$4\frac{33}{64}$ to $5\frac{1}{2}$	18	
15	26.40	$5\frac{33}{64}$ to 6	19	No. 6

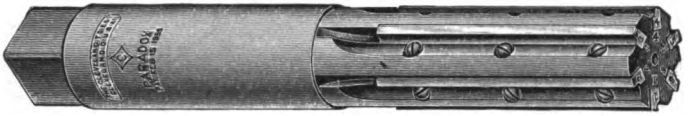
These Arbors are regular in all respects.

Arbors for Reamers smaller than $3\frac{9}{64}$ inches diameter shown on page 149. For "Paradox" Shell Reamers see pages 146, 147.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 306—"Paradox" Adjustable Hand Reamers

Code Word—LEAGUER



Patented February 15, 1898

Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches
1	$6.40	3	7 5/8	2 1/32	$12.90	4 1/2	11 3/8
1 1/32	6.55	3	7 3/4	2 1/16	13.25	4 1/2	11 1/2
1 1/16	6.70	3 1/8	7 7/8	2 3/32	13.50	4 1/2	11 1/2
1 3/32	6.85	3 1/8	8	2 1/8	13.75	4 1/2	11 5/8
1 1/8	7.00	3 1/8	8 1/8	2 5/32	14.00	4 1/2	11 3/4
1 5/32	7.20	3 1/8	8 1/4	2 3/16	14.25	4 3/4	11 7/8
1 3/16	7.40	3 1/4	8 1/4	2 7/32	14.55	4 3/4	12
1 7/32	7.60	3 1/4	8 3/8	2 1/4	14.80	4 3/4	12 1/8
1 1/4	7.80	3 1/4	8 1/2	2 9/32	15.05	4 3/4	12 1/4
1 9/32	8.00	3 1/4	8 5/8	2 5/16	15.30	4 3/4	12 3/8
1 5/16	8.20	3 1/2	8 3/4	2 11/32	15.60	4 3/4	12 1/2
1 11/32	8.40	3 1/2	8 7/8	2 3/8	15.85	5	12 5/8
1 3/8	8.60	3 1/2	9	2 13/32	16.15	5	12 5/8
1 13/32	8.80	3 1/2	9 1/8	2 7/16	16.40	5	12 3/4
1 7/16	9.00	3 1/2	9 1/4	2 15/32	16.65	5	12 7/8
1 15/32	9.20	3 1/2	9 3/8	2 1/2	16.90	5	13
1 1/2	9.40	3 3/4	9 1/2	2 17/32	17.20	5	13 1/8
1 17/32	9.60	3 3/4	9 1/2	2 9/16	17.45	5 1/4	13 1/4
1 9/16	9.80	3 3/4	9 5/8	2 19/32	17.70	5 1/4	13 3/8
1 19/32	10.00	3 3/4	9 3/4	2 5/8	17.95	5 1/4	13 1/2
1 5/8	10.20	4	9 7/8	2 21/32	18.25	5 1/4	13 5/8
1 21/32	10.40	4	10	2 11/16	18.50	5 1/4	13 3/4
1 11/16	10.60	4	10 1/8	2 23/32	18.75	5 1/4	13 3/4
1 23/32	10.80	4	10 1/4	2 3/4	19.00	5 1/4	13 7/8
1 3/4	11.00	4	10 1/4	2 25/32	19.30	5 1/4	14
1 25/32	11.20	4	10 3/8	2 13/16	19.55	5 1/4	14 1/8
1 13/16	11.40	4 1/4	10 1/2	2 27/32	19.85	5 1/4	14 1/4
1 27/32	11.60	4 1/4	10 5/8	2 7/8	20.10	5 1/4	14 3/8
1 7/8	11.80	4 1/4	10 3/4	2 29/32	20.35	5 1/4	14 1/2
1 29/32	12.00	4 1/4	10 7/8	2 15/16	20.60	5 1/4	14 5/8
1 15/16	12.20	4 1/4	11	2 31/32	20.90	5 1/4	14 3/4
1 31/32	12.45	4 1/4	11 1/8	3	21.15	5 1/4	14 7/8
2	12.65	4 1/2	11 1/4				

These Reamers can be furnished down to 11/16-inch diameter, but on account of their construction, the sizes smaller than 1 inch are not strong enough for any but the very lightest sort of work and we do not recommend their use.

For expanding these Reamers, Tinfoil of .001 and .0005-inch thickness will be furnished upon application.

THE REAMING LIFE OF 8-10 REAMERS—PAGE 144

No. 312—"Paradox" Chucking Reamers

Code Word—LEASING

(Eccentric Flutes)

Patented February 15, 1898

Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches
1	$5.00	1¾	10½	2 1/32	$10.45	2½	14
1 1/32	5.15	1¾	10½	2 1/16	10.65	2½	14½
1 1/16	5.25	1¾	10½	2 3/32	10.85	2½	14½
1 3/32	5.40	1¾	10½	2⅛	11.05	2½	14½
1⅛	5.50	2	11	2 5/32	11.25	2½	14½
1 5/32	5.60	2	11	2 3/16	11.45	2½	14½
1 3/16	5.75	2	11	2 7/32	11.70	2½	14½
1 7/32	5.90	2	11	2¼	11.90	2½	14½
1¼	6.00	2	11½	2 9/32	12.05	2½	14½
1 9/32	6.25	2	11½	2 5/16	12.20	2¾	15
1 5/16	6.50	2	11½	2 11/32	12.35	2¾	15
1 11/32	6.75	2	11½	2⅜	12.50	2¾	15
1⅜	7.00	2	12	2 13/32	12.65	2¾	15
1 13/32	7.25	2	12	2 7/16	12.80	2¾	15
1 7/16	7.50	2	12	2 15/32	12.95	2¾	15
1 15/32	7.75	2	12	2½	13.10	2¾	15
1½	8.00	2	12½	2 17/32	13.35	2¾	15
1 17/32	8.15	2	12½	2 9/16	13.60	2¾	15½
1 9/16	8.25	2	12½	2 19/32	13.90	2¾	15½
1 19/32	8.40	2	12½	2⅝	14.20	2¾	15½
1 5/8	8.50	2¼	13	2 21/32	14.55	2¾	15½
1 21/32	8.65	2¼	13	2 11/16	14.90	3	15½
1 11/16	8.75	2¼	13	2 23/32	15.30	3	15½
1 23/32	8.90	2¼	13	2¾	15.65	3	15½
1¾	9.00	2¼	13½	2 25/32	16.05	3	15½
1 25/32	9.15	2¼	13½	2 13/16	16.45	3	16
1 13/16	9.30	2½	13½	2 27/32	16.90	3	16
1 27/32	9.45	2½	13½	2⅞	17.30	3	16
1⅞	9.60	2½	14	2 29/32	17.75	3	16
1 29/32	9.75	2½	14	2 15/16	18.20	3	16
1 15/16	9.90	2½	14	2 31/32	18.65	3	16
1 31/32	10.05	2½	14	3	19.10	3	16
2	10.25	2½	14				

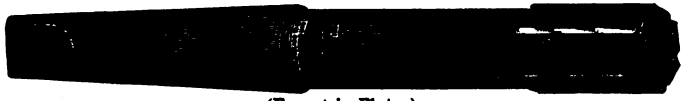
These Reamers can be furnished down to 11/16-inch diameter, but on account of their construction, the sizes smaller than 1 inch are not strong enough for any but the very lightest sort of work and we do not recommend their use.

For expanding these Reamers, Tinfoil of .001 and .0005-inch thickness will be furnished upon application.

FOR IDEAL MACHINE REAMERS SEE PAGE 154

No. 317—"Paradox" Adjustable Chucking Reamer with Taper Shanks

Code Word—LEADWALL



(Eccentric Flutes)

Patented February 15, 1898

Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches	Shank Taper	Diameter Inches	Price Each	Length of Blade Inches	Length Over All Inches	Shank Taper
1	$5.00	1¾	10½		2	$10.25	2½	14	
1 1/32	5.15	1¾	10½		2 1/32	10.45	2½	14	
1 1/16	5.25	1¾	10½		2 1/16	10.65	2½	14½	
1 3/32	5.40	1¾	10½		2 3/32	10.85	2½	14½	
1⅛	5.50	2	11	No.3	2⅛	11.05	2½	14½	
1 5/32	5.60	2	11		2 5/32	11.25	2½	14½	
1 3/16	5.75	2	11		2 3/16	11.45	2½	14½	
1 7/32	5.90	2	11		2 7/32	11.70	2½	14½	
					2¼	11.90	2½	14½	
1¼	6.00	2	11½		2 9/32	12.05	2½	14½	
1 9/32	6.25	2	11½		2 5/16	12.20	2¾	15	
1 5/16	6.50	2	11½		2 11/32	12.35	2¾	15	
1 11/32	6.75	2	11½		2⅜	12.50	2¾	15	
1⅜	7.00	2	12		2 13/32	12.65	2¾	15	
1 13/32	7.25	2	12		2 7/16	12.80	2¾	15	
1 7/16	7.50	2	12		2 15/32	12.95	2¾	15	
1 15/32	7.75	2	12	No.4	2½	13.10	2¾	15	No. 5
1½	8.00	2	12½		2 17/32	13.35	2¾	15	
1 17/32	8.15	2	12½		2 9/16	13.60	2¾	15½	
1 9/16	8.25	2	12½		2 19/32	13.90	2¾	15½	
1 19/32	8.40	2	12½		2 5/8	14.20	2¾	15½	
1 5/8	8.50	2¼	13		2 21/32	14.55	2¾	15½	
1 21/32	8.65	2¼	13		2 11/16	14.90	3	15½	
1 11/16	8.75	2¼	13		2 23/32	15.30	3	15½	
1 23/32	8.90	2¼	13		2¾	15.65	3	15½	
					2 25/32	16.05	3	15½	
1¾	9.00	2¼	13½		2 13/16	16.45	3	16	
1 25/32	9.15	2¼	13½		2 27/32	16.90	3	16	
1 13/16	9.30	2½	13½		2⅞	17.30	3	16	
1 27/32	9.45	2½	13½	No.5	2 29/32	17.75	3	16	
1⅞	9.60	2½	14		2 15/16	18.20	3	16	
1 29/32	9.75	2½	14		2 31/32	18.65	3	16	
1 15/16	9.90	2½	14		3	19.10	3	16	
1 31/32	10.05	2½	14						

These Reamers can be furnished down to ¼-inch diameter, but on account of their construction, the sizes smaller than 1 inch are not strong enough for any but the very lightest sort of work, and we do not recommend their use.

For expanding these Reamers Tinfoil of .001 and .0005-inch thickness will be furnished upon application.

WHEN A TANG TWISTS OFF, SEE PAGE 24

"Peerless" High Speed Reamers

Detailed Index—Pages 4 to 17

"Brazo-Hardening" a "Peerless" High Speed Reamer. A patented process which gives "Peerless" unique advantages, of decided interest to users of high speed reamers.

"Peerless" High Speed Reamers

The "Brazo-Hardening" Process The peculiar advantages of "Peerless" composite construction, combining the hardness and cutting qualities of solid high speed reamers with a toughness greater than that of the best carbon steel reamers, have been demonstrated in the leading shops of this country. Our patented process of "Brazo-Hardening" high speed blades into the soft steel body produces practically a one-piece solid reamer that can be run at surface speeds of from 50 to 100 feet per minute, according to the material to be cut.

Maximum Toughness at Minimum Cost The soft steel body not only gives "Peerless" Reamers great toughness, but allows of their being marketed at a price considerably below that of solid high speed reamers.

The Unusual Expansion Feature Special attention is called to the expanding feature of the "Peerless" Reamers, an adaption practically impossible with any other high speed reamer. The expansion takes place at the cutting end and, on account of the toughness and pliability of the "Peerless" body, is of greater range than in carbon steel expansion reamers.

For Machine Reaming and Turret Lathes "Peerless" Reamers are in a class by themselves for all machine reaming. We recommend them without hesitation, knowing they will prove their own best advocates.

"Peerless" Reamers for Turret Lathes will be found in the Turret Tool Section, pages 181 to 183.

High Speed Reamers

No. 501—"Peerless" Hand Reamers

Code Word—LOADER

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/2	$2.85	3	6	1 17/32	$12.50	6 1/2	13
17/32	3.00	3 1/8	6 1/4	1 9/16	13.00	6 1/2	13
9/16	3.10	3 1/4	6 1/2	1 19/32	13.50	6 1/2	13
19/32	3.20	3 3/8	6 3/4	1 5/8	14.00	6 1/2	13
5/8	3.30	3 1/2	7	1 21/32	14.50	6 3/4	13 1/2
21/32	3.45	3 43/64	7 11/32	1 11/16	15.00	6 3/4	13 1/2
11/16	3.60	3 27/32	7 7/16	1 23/32	15.50	6 3/4	13 1/2
23/32	3.75	4 1/16	8 1/8	1 3/4	16.00	6 3/4	13 1/2
3/4	3.90	4 1/16	8 3/8	1 25/32	16.50	6 3/4	13 1/2
25/32	4.10	4 23/64	8 23/32	1 13/16	17.00	6 3/4	13 1/2
13/16	4.30	4 27/32	9 1/16	1 27/32	17.50	6 3/4	13 1/2
27/32	4.50	4 11/16	9 3/8	1 7/8	18.00	7	14
7/8	4.70	4 27/32	9 11/16	1 29/32	18.60	7	14
29/32	4.90	5 3/64	10 3/32	1 15/16	19.20	7	14
15/16	5.15	5 1/8	10 1/4	1 31/32	20.00	7	14
31/32	5.40	5 11/32	10 11/16	2	20.80	7	14
1	5.65	5 7/16	10 7/8	2 1/16	21.80	7 1/4	14 1/2
1 1/32	6.00	5 17/32	11 1/16	2 1/8	22.80	7 1/4	14 1/2
1 1/16	6.40	5 5/8	11 1/4	2 3/16	24.00	7 1/2	15
1 3/32	6.80	5 23/32	11 7/16	2 1/4	25.20	7 1/2	15
1 1/8	7.20	5 13/16	11 5/8	2 5/16	26.60	7 1/2	15
1 5/32	7.60	5 29/32	11 13/16	2 3/8	27.80	7 1/2	15
1 3/16	8.00	6	12	2 7/16	29.00	7 3/4	15 1/2
1 7/32	8.40	6 1/16	12 1/8	2 1/2	30.35	7 3/4	15 1/2
1 1/4	8.80	6 1/8	12 1/4	2 9/16	31.60	7 3/4	15 1/2
1 9/32	9.20	6 11/64	12 11/32	2 5/8	32.90	8	16
1 5/16	9.60	6 7/32	12 7/16	2 11/16	34.20	8	16
1 11/32	10.00	6 17/64	12 17/32	2 3/4	35.60	8	16
1 3/8	10.40	6 5/16	12 5/8	2 13/16	37.00	8 1/4	16 1/2
1 13/32	10.80	6 23/64	12 23/32	2 7/8	38.50	8 1/4	16 1/2
1 7/16	11.20	6 13/32	12 13/16	2 15/16	40.20	8 1/4	16 1/2
1 15/32	11.60	6 29/64	12 29/32	3	42.00	8 1/4	16 1/2
1 1/2	12.00	6 1/2	13				

KEEP "PEERLESS" BLADES SHARP

High Speed Reamers

No. 502—"Peerless" Expansion Hand Reamers

Code Word—LOAF

Patented March 26, 1907
February 15, 1910

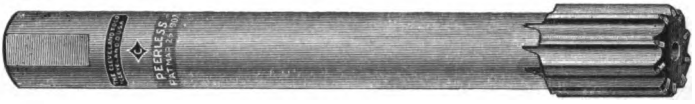
Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/2	$4.50	3	6	1 7/32	$12.30	6	12 1/8
17/32	4.75	3 1/8	6 1/4	1 1/4	12.90	6 1/8	12 1/4
9/16	5.00	3 1/4	6 1/2	1 9/32	13.50	6 1/8	12 11/32
19/32	5.25	3 3/8	6 3/4	1 5/16	14.20	6 1/4	12 7/16
5/8	5.50	3 1/2	7	1 11/32	14.90	6 1/4	12 17/32
21/32	5.75	3 11/16	7 11/32	1 3/8	15.65	6 3/8	12 5/8
11/16	6.00	3 7/8	7 11/16	1 13/32	16.40	6 3/8	12 23/32
23/32	6.25	4 1/16	8 1/8	1 7/16	17.15	6 3/8	12 13/16
3/4	6.50	4 3/16	8 3/8	1 15/32	17.90	6 1/2	12 29/32
25/32	6.75	4 3/8	8 23/32	1 1/2	18.60	6 1/2	13
13/16	7.00	4 1/2	9 1/16	1 9/16	19.60	6 1/2	13
27/32	7.25	4 11/16	9 3/8	1 5/8	20.70	6 1/2	13
7/8	7.50	4 7/8	9 11/16	1 11/16	21.80	6 3/4	13 1/2
29/32	7.80	5 1/8	10 3/32	1 3/4	23.00	6 3/4	13 1/2
15/16	8.10	5 1/8	10 1/4	1 13/16	24.25	6 3/4	13 1/2
31/32	8.50	5 5/16	10 11/16	1 7/8	25.55	7	14
1	8.90	5 1/2	10 7/8	1 15/16	26.90	7	14
1 1/32	9.30	5 1/2	11 1/16	2	28.40	7	14
1 1/16	9.70	5 5/8	11 1/4	2 1/8	30.10	7 1/4	14 5/8
1 3/32	10.20	5 3/4	11 7/16	2 1/4	32.00	7 1/2	15
1 1/8	10.70	5 3/4	11 5/8	2 3/8	34.10	7 1/2	15
1 5/32	11.20	5 7/8	11 13/16	2 1/2	36.50	7 3/4	15 1/2
1 3/16	11 70	6	12				

WHAT IS "BRAZO-HARDENING"—SEE PAGE 154

High Speed Reamers

No. 503—"Peerless" Straight Shank Chucking Reamers

Code Word—LOAMY



Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
1/2	$2.50	1 1/8	8	1 7/16	$7.55	2	12
17/32	2.60	1 1/8	8	1 1/2	7.90	2 1/8	12 1/2
9/16	2.70	1 1/8	8	1 9/16	8.20	2 1/8	12 1/2
19/32	2.80	1 1/8	8	1 5/8	8.55	2 1/4	13
5/8	2.90	1 1/4	9	1 11/16	9.00	2 1/4	13
21/32	3.00	1 1/4	9	1 3/4	9.50	2 3/8	13 1/2
11/16	3.15	1 1/4	9	1 13/16	10.00	2 3/8	13 1/2
23/32	3.30	1 1/4	9	1 7/8	10.60	2 1/2	14
3/4	3.45	1 3/8	9 1/2	1 15/16	11.25	2 1/2	14
25/32	3.60	1 3/8	9 1/2	2	12.00	2 1/2	14
13/16	3.80	1 3/8	9 1/2	2 1/16	12.75	2 3/4	14 1/2
27/32	4.00	1 3/8	9 1/2	2 1/8	13.50	2 3/4	14 1/2
7/8	4.25	1 1/2	10	2 3/16	14.50	2 3/4	14 1/2
29/32	4.50	1 1/2	10	2 1/4	15.50	2 3/4	14 1/2
15/16	4.75	1 1/2	10	2 5/16	16.70	3	15
31/32	5.00	1 1/2	10	2 3/8	17.90	3	15
1	5.20	1 5/8	10 1/2	2 7/16	19.10	3	15
1 1/32	5.35	1 5/8	10 1/2	2 1/2	20.30	3	15
1 1/16	5.50	1 5/8	10 1/2	2 9/16	21.50	3 1/4	15 1/2
1 3/32	5.65	1 5/8	10 1/2	2 5/8	22.75	3 1/4	15 1/2
1 1/8	5.85	1 3/4	11	2 11/16	24.00	3 1/4	15 1/2
1 5/32	6.05	1 3/4	11	2 3/4	25.20	3 1/4	15 1/2
1 3/16	6.20	1 3/4	11	2 13/16	26.40	3 1/2	16
1 7/32	6.40	1 3/4	11	2 7/8	27.60	3 1/2	16
1 1/4	6.60	1 7/8	11 1/2	2 15/16	28.80	3 1/2	16
1 5/16	6.85	1 7/8	11 1/2	3	30.00	3 1/2	16
1 3/8	7.20	2	12				

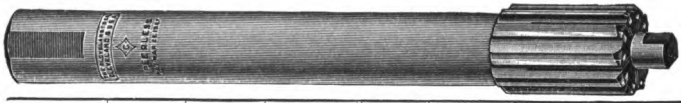
We can furnish these Reamers in millimeter sizes when desired.

DOUBLE PRODUCTION PER DOLLAR—PAGE 154

High Speed Reamers

No. 504—"Peerless" Straight Shank Expansion Chucking Reamers

Code Word—LOANED



Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
3/4	$5.50	1 3/8	9 1/2	1 11/16	$14.30	2 1/4	13
25/32	5.75	1 3/8	9 1/2	1 3/4	15.00	2 3/8	13 1/2
13/16	6.00	1 3/8	9 1/2	1 13/16	15.70	2 3/8	13 1/2
27/32	6.25	1 3/8	9 1/2	1 7/8	16.40	2 1/2	14
7/8	6.50	1 1/2	10	1 15/16	17.20	2 1/2	14
29/32	6.80	1 1/2	10	2	18.00	2 1/2	14
15/16	7.10	1 1/2	10	2 1/16	18.80	2 3/4	14 1/2
31/32	7.40	1 1/2	10	2 1/8	19.70	2 3/4	14 1/2
1	7.80	1 5/8	10 1/2	2 3/16	21.60	2 3/4	14 1/2
1 1/32	8.20	1 5/8	10 1/2	2 1/4	22.50	2 3/4	14 1/2
1 1/16	8.60	1 5/8	10 1/2	2 5/16	23.40	3	15
1 3/32	9.00	1 5/8	10 1/2	2 3/8	24.40	3	15
1 1/8	9.40	1 3/4	11	2 7/16	25.50	3	15
1 5/32	9.70	1 3/4	11	2 1/2	26.60	3	15
1 3/16	10.00	1 3/4	11	2 9/16	27.80	3 1/4	15 1/2
1 7/32	10.30	1 3/4	11	2 5/8	29.00	3 1/4	15 1/2
1 1/4	10.70	1 7/8	11 1/2	2 11/16	30.20	3 1/4	15 1/2
1 5/16	11.10	1 7/8	11 1/2	2 3/4	31.50	3 1/4	15 1/2
1 3/8	11.50	2	12	2 13/16	32.80	3 1/2	16
1 7/16	12.00	2	12	2 7/8	34.20	3 1/2	16
1 1/2	12.50	2 1/8	12 1/2	2 15/16	35.70	3 1/2	16
1 9/16	13.10	2 1/8	12 1/2	3	37.30	3 1/2	16
1 5/8	13.70	2 1/4	13				

"Peerless" Expansion Reamers are not intended to ream smaller than size stamped on body.

The expansive feature is designed to maintain the initial size by compensating for wear at the cutting end.

KEEP "PEERLESS" BLADES SHARP

High Speed Reamers

No. 509—"Peerless" Straight Shank Core Reamers

Code Word—LOCALE

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
5/8	$2.90	1 1/4	9	1 9/16	$8.20	2 1/8	12 1/2
21/32	3.00	1 1/4	9	1 5/8	8.55	2 1/4	13
11/16	3.15	1 1/4	9	1 11/16	9.00	2 1/4	13
23/32	3.30	1 1/4	9	1 3/4	9.50	2 3/8	13 1/2
3/4	3.45	1 3/8	9 1/2	1 13/16	10.00	2 3/8	13 1/2
25/32	3.60	1 3/8	9 1/2	1 7/8	10.60	2 1/2	14
13/16	3.80	1 3/8	9 1/2	1 15/16	11.25	2 1/2	14
27/32	4.00	1 3/8	9 1/2	2	12.00	2 1/2	14
7/8	4.25	1 1/2	10	2 1/16	12.75	2 3/4	14 1/2
29/32	4.50	1 1/2	10	2 1/8	13.50	2 3/4	14 1/2
15/16	4.75	1 1/2	10	2 3/16	14.50	2 3/4	14 1/2
31/32	5.00	1 1/2	10	2 1/4	15.50	2 3/4	14 1/2
1	5.20	1 5/8	10 1/2	2 5/16	16.70	3	15
1 1/32	5.35	1 5/8	10 1/2	2 3/8	17.90	3	15
1 1/16	5.50	1 5/8	10 1/2	2 7/16	19.10	3	15
1 3/32	5.65	1 5/8	10 1/2	2 1/2	20.30	3	15
1 1/8	5.85	1 3/4	11	2 9/16	21.50	3 1/4	15 1/2
1 5/32	6.05	1 3/4	11	2 5/8	22.75	3 1/4	15 1/2
1 3/16	6.20	1 3/4	11	2 11/16	24.00	3 1/4	15 1/2
1 7/32	6.40	1 3/4	11	2 3/4	25.20	3 1/4	15 1/2
1 1/4	6.60	1 7/8	11 1/2	2 13/16	26.40	3 1/2	16
1 5/16	6.85	1 7/8	11 1/2	2 7/8	27.60	3 1/2	16
1 3/8	7.20	2	12	2 15/16	28.80	3 1/2	16
1 7/16	7.55	2	12	3	30.00	3 1/2	16
1 1/2	7.90	2 1/8	12 1/2				

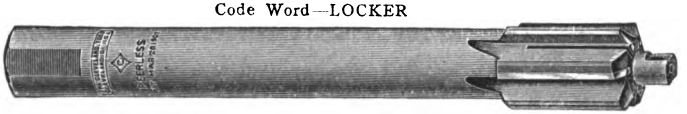
"Peerless" Core Reamers, for rough boring cored or drilled holes, have heavy flutes and deep grooves. They may be end ground until entirely used up. To insure a perfectly finished hole, they should be followed with a finishing reamer.

WHEN A STUD SNAPS SEE PAGE 174

High Speed Reamers

No. 510—"Peerless" Straight Shank Expansion Core Reamers

Code Word—LOCKER



Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches
7/8	$6.50	1½	10	1 13/16	$15.70	2⅜	13½
29/32	6.80	1½	10	1⅞	16.40	2½	14
15/16	7.10	1½	10	1 15/16	17.20	2½	14
31/32	7.40	1½	10	2	18.00	2½	14
1	7.80	1⅝	10½	2 1/16	18.80	2¾	14½
1 1/32	8.20	1⅝	10½	2⅛	19.70	2¾	14½
1 1/16	8.60	1⅝	10½	2 3/16	21.60	2¾	14½
1 3/32	9.00	1⅝	10½	2¼	22.50	2¾	14½
1⅛	9.40	1¾	11	2 5/16	23.40	3	15
1 5/32	9.70	1¾	11	2⅜	24.40	3	15
1 3/16	10.00	1¾	11	2 7/16	25.50	3	15
1 7/32	10.30	1¾	11	2½	26.60	3	15
1¼	10.70	1⅞	11½	2 9/16	27.80	3¼	15½
1 5/16	11.10	1⅞	11½	2⅝	29.00	3¼	15½
1⅜	11.50	2	12	2 11/16	30.20	3¼	15½
1 7/16	12.00	2	12	2¾	31.50	3¼	15½
1½	12.50	2⅛	12½	2 13/16	32.80	3½	16
1 9/16	13.10	2⅛	12½	2⅞	34.20	3½	16
1⅝	13.70	2¼	13	2 15/16	35.70	3½	16
1 11/16	14.30	2¼	13	3	37.30	3½	16
1¾	15.00	2⅜	13½				

"Peerless" Expansion Reamers are not intended to ream smaller than size stamped on body.

The expansive feature is designed to maintain the initial size by compensating for wear at the cutting end.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

High Speed Reamers

No. 515—"Peerless" Taper Shank Chucking Reamers

Code Word—LOGWOOD

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper
1/2	$2.70	1 1/8	8		1 3/8	$8.20	2	12	
17/32	2.80	1 1/8	8		1 7/16	8.60	2	12	
9/16	2.90	1 1/8	8		1 1/2	9.00	2 1/8	12 1/2	
19/32	3.00	1 1/8	8	No.2	1 9/16	9.40	2 1/8	12 1/2	No. 4
5/8	3.10	1 1/4	9		1 5/8	9.80	2 1/4	13	
21/32	3.20	1 1/4	9		1 11/16	10.25	2 1/4	13	
11/16	3.30	1 1/4	9						
23/32	3.50	1 1/4	9		1 3/4	10.75	2 3/8	13 1/2	
					1 13/16	11.25	2 3/8	13 1/2	
3/4	3.70	1 3/8	9 1/2		1 7/8	11.80	2 1/2	14	
25/32	3.90	1 3/8	9 1/2		1 15/16	12.40	2 1/2	14	
13/16	4.10	1 3/8	9 1/2		2	13.00	2 1/2	14	
27/32	4.30	1 3/8	9 1/2		2 1/16	13.80	2 3/4	14 1/2	
7/8	4.50	1 1/2	10		2 1/8	14.60	2 3/4	14 1/2	
29/32	4.75	1 1/2	10		2 3/16	15.50	2 3/4	14 1/2	
15/16	5.00	1 1/2	10	No.3	2 1/4	16.50	2 3/4	14 1/2	
31/32	5.25	1 1/2	10		2 5/16	17.80	3	15	
1	5.50	1 5/8	10 1/2		2 3/8	19.10	3	15	No. 5
1 1/32	5.75	1 5/8	10 1/2		2 7/16	20.40	3	15	
1 1/16	6.00	1 5/8	10 1/2		2 1/2	21.70	3	15	
1 3/32	6.25	1 5/8	10 1/2		2 9/16	23.00	3 1/4	15 1/2	
					2 5/8	24.30	3 1/4	15 1/2	
1 1/8	6.50	1 3/4	11		2 11/16	25.60	3 1/4	15 1/2	
1 5/32	6.75	1 3/4	11		2 3/4	26.90	3 1/4	15 1/2	
1 3/16	7.00	1 3/4	11	No.4	2 13/16	28.20	3 1/2	16	
1 7/32	7.30	1 3/4	11		2 7/8	29.50	3 1/2	16	
1 1/4	7.60	1 7/8	11 1/2		2 15/16	30.75	3 1/2	16	
1 5/16	7.90	1 7/8	11 1/2		3	32.00	3 1/2	16	

THROUGH 57 1/2 INCHES OF CAST IRON PER MINUTE—PAGE 82

High Speed Reamers

No. 516—"Peerless" Taper Shank Expansion Chucking Reamers

Code Word—LOOP

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper
3/4	$6.00	1 3/8	9 1/2	No.3
25/32	6.20	1 3/8	9 1/2	
13/16	6.40	1 3/8	9 1/2	
27/32	6.70	1 3/8	9 1/2	
7/8	7.00	1 1/2	10	
29/32	7.30	1 1/2	10	
15/16	7.60	1 1/2	10	
31/32	7.90	1 1/2	10	
1	8.30	1 5/8	10 1/2	
1 1/32	8.60	1 5/8	10 1/2	
1 1/16	9.00	1 5/8	10 1/2	
1 3/32	9.40	1 5/8	10 1/2	
1 1/8	9.80	1 3/4	11	No.4
1 5/32	10.20	1 3/4	11	
1 3/16	10.60	1 3/4	11	
1 7/32	11.00	1 3/4	11	
1 1/4	11.50	1 7/8	11 1/2	
1 5/16	12.00	1 7/8	11 1/2	
1 3/8	12.50	2	12	
1 7/16	13.10	2	12	
1 1/2	13.60	2 1/8	12 1/2	
1 9/16	14.20	2 1/8	12 1/2	
1 5/8	$14.85	2 1/4	13	No. 4
1 11/16	15.50	2 1/4	13	
1 3/4	16.30	2 3/8	13 1/2	No. 5
1 13/16	17.10	2 3/8	13 1/2	
1 7/8	18.00	2 1/2	14	
1 15/16	18.90	2 1/2	14	
2	19.80	2 1/2	14	
2 1/16	20.70	2 3/4	14 1/2	
2 1/8	21.60	2 3/4	14 1/2	
2 3/16	23.50	2 3/4	14 1/2	
2 1/4	24.50	2 3/4	14 1/2	
2 5/16	25.60	3	15	
2 3/8	26.75	3	15	
2 7/16	28.00	3	15	
2 1/2	29.30	3	15	
2 9/16	30.75	3 1/4	15 1/2	
2 5/8	32.25	3 1/4	15 1/2	
2 11/16	33.80	3 1/4	15 1/2	
2 3/4	35.40	3 1/4	15 1/2	
2 13/16	37.00	3 1/2	16	
2 7/8	38.70	3 1/2	16	
2 15/16	40.50	3 1/2	16	
3	42.50	3 1/2	16	

The Expansion of this Reamer is primarily for maintaining the size at the point where it wears in use.

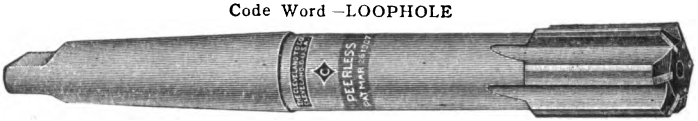
It is not intended to ream smaller than the size stamped on the shank.

DOUBLE THE STRENGTH AT A SAVING—PAGE 24

High Speed Reamers

No. 517—"Peerless" Taper Shank Core Reamers

Code Word—LOOPHOLE



Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper
5/8	$3.10	1 1/4	9		1 1/2	$9.00	2 1/8	12 1/2	
21/32	3.20	1 1/4	9		1 9/16	9.40	2 1/8	12 1/2	
11/16	3.30	1 1/4	9	No.2	1 5/8	9.80	2 1/4	13	No.4
23/32	3.50	1 1/4	9		1 11/16	10.25	2 1/4	13	
3/4	3.70	1 3/8	9 1/2		1 3/4	10.75	2 3/8	13 1/2	
25/32	3.90	1 3/8	9 1/2		1 13/16	11.25	2 3/8	13 1/2	
13/16	4.10	1 3/8	9 1/2		1 7/8	11.80	2 1/2	14	
27/32	4.30	1 3/8	9 1/2		1 15/16	12.40	2 1/2	14	
7/8	4.50	1 1/2	10		2	13.00	2 1/2	14	
29/32	4.75	1 1/2	10		2 1/16	13.80	2 3/4	14 1/2	
15/16	5.00	1 1/2	10	No.3	2 1/8	14.60	2 3/4	14 1/2	
31/32	5.25	1 1/2	10		2 3/16	15.50	2 3/4	14 1/2	
1	5.50	1 5/8	10 1/2		2 1/4	16.50	2 3/4	14 1/2	
1 1/32	5.75	1 5/8	10 1/2		2 5/16	17.80	3	15	
1 1/16	6.00	1 5/8	10 1/2		2 3/8	19.10	3	15	No.5
1 3/32	6.25	1 5/8	10 1/2		2 7/16	20.40	3	15	
					2 1/2	21.70	3	15	
1 1/8	6.50	1 3/4	11		2 9/16	23.00	3 1/4	15 1/2	
1 5/32	6.75	1 3/4	11		2 5/8	24.30	3 1/4	15 1/2	
1 3/16	7.00	1 3/4	11		2 11/16	25.60	3 1/4	15 1/2	
1 7/32	7.30	1 3/4	11		2 3/4	26.90	3 1/4	15 1/2	
1 1/4	7.60	1 7/8	11 1/2	No.4	2 13/16	28.20	3 1/2	16	
1 5/16	7.90	1 7/8	11 1/2		2 7/8	29.50	3 1/2	16	
1 3/8	8.20	2	12		2 15/16	30.75	3 1/2	16	
1 7/16	8.60	2	12		3	32.00	3 1/2	16	

Core Reamers are particularly adapted for enlarging cored holes or where only the roughing out of holes is required.

To get a smooth hole it is always well to follow with a finishing Reamer.

KEEP "PEERLESS" BLADES SHARP

High Speed Reamers

No. 518—"Peerless" Taper Shank Expansion Core Reamers

Code Word—LOTUS

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper	Diameter Inches	Price Each	Length of Flute Inches	Length Over All Inches	Shank Taper
7/8	$7.00	1 1/2	10		1 3/4	$16.30	2 3/8	13 1/2	
29/32	7.30	1 1/2	10		1 13/16	17.10	2 3/8	13 1/2	
15/16	7.60	1 1/2	10		1 7/8	18.00	2 1/2	14	
31/32	7.90	1 1/2	10		1 15/16	18.90	2 1/2	14	
1	8.30	1 5/8	10 1/2	No.3	2	19.80	2 1/2	14	
1 1/32	8.60	1 5/8	10 1/2		2 1/16	20.70	2 3/4	14 1/2	
1 1/16	9.00	1 5/8	10 1/2		2 1/8	21.60	2 3/4	14 1/2	
1 3/32	9.40	1 5/8	10 1/2		2 3/16	23.50	2 3/4	14 1/2	
					2 1/4	24.50	2 3/4	14 1/2	
1 1/8	9.80	1 3/4	11		2 5/16	25.60	3	15	
1 5/32	10.20	1 3/4	11		2 3/8	26.75	3	15	No. 5
1 3/16	10.60	1 3/4	11		2 7/16	28.00	3	15	
1 7/32	11.00	1 3/4	11		2 1/2	29.30	3	15	
1 1/4	11.50	1 7/8	11 1/2		2 9/16	30.75	3 1/4	15 1/2	
1 5/16	12.00	1 7/8	11 1/2	No.4	2 5/8	32.25	3 1/4	15 1/2	
1 3/8	12.50	2	12		2 11/16	33.80	3 1/4	15 1/2	
1 7/16	13.10	2	12		2 3/4	35.40	3 1/4	15 1/2	
1 1/2	13.60	2 1/8	12 1/2		2 13/16	37.00	3 1/2	16	
1 9/16	14.20	2 1/8	12 1/2		2 7/8	38.70	3 1/2	16	
1 5/8	14.85	2 1/4	13		2 15/16	40.50	3 1/2	16	
1 11/16	15.50	2 1/4	13		3	42.50	3 1/2	16	

The Expansion of this Reamer is primarily intended to take up the wear at the end where the cutting is done.

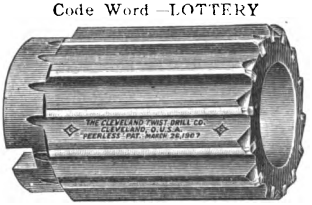
The Reamer will be found especially serviceable for enlarging cored holes and where only the roughing out of holes is required.

WHEN A CAP SCREW SNAPS SEE PAGE 174

High Speed Reamers

No. 519—"Peerless" Shell Reamers

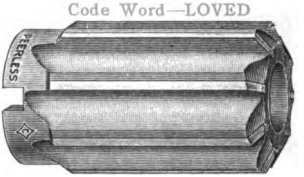
Code Word—LOTTERY



Patented March 26, 1907
February 15, 1910

No. 521—"Peerless" Shell Core Reamers

Code Word—LOVED



Patented March 26, 1907
February 15, 1910

Note: No. 521 not made smaller than $1\frac{1}{16}$ inch

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
$\frac{7}{8}$	$2.50	$\frac{1}{2}$	$2\frac{1}{2}$	No. 5
$\frac{15}{16}$	2.65	$\frac{1}{2}$	$2\frac{1}{2}$	
1	2.80	$\frac{1}{2}$	$2\frac{1}{2}$	
$1\frac{1}{16}$	3.00	$\frac{5}{8}$	$2\frac{3}{4}$	No. 6
$1\frac{1}{8}$	3.20	$\frac{5}{8}$	$2\frac{3}{4}$	
$1\frac{3}{16}$	3.40	$\frac{5}{8}$	$2\frac{3}{4}$	
$1\frac{1}{4}$	3.60	$\frac{5}{8}$	$2\frac{3}{4}$	
$1\frac{5}{16}$	3.80	$\frac{3}{4}$	3	No. 7
$1\frac{3}{8}$	4.00	$\frac{3}{4}$	3	
$1\frac{7}{16}$	4.20	$\frac{3}{4}$	3	
$1\frac{1}{2}$	4.50	$\frac{3}{4}$	3	
$1\frac{9}{16}$	4.80	$\frac{3}{4}$	3	
$1\frac{5}{8}$	5.10	$\frac{3}{4}$	3	
$1\frac{11}{16}$	5.50	1	$3\frac{1}{2}$	No. 8
$1\frac{3}{4}$	5.90	1	$3\frac{1}{2}$	
$1\frac{13}{16}$	6.30	1	$3\frac{1}{2}$	
$1\frac{7}{8}$	6.70	1	$3\frac{1}{2}$	
$1\frac{15}{16}$	7.10	1	$3\frac{1}{2}$	
2	7.50	1	$3\frac{1}{2}$	

No. 521 not made smaller than $1\frac{3}{16}$ inch

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
$2\frac{1}{16}$	$8.00	$1\frac{1}{4}$	$3\frac{3}{4}$	No. 9
$2\frac{1}{8}$	8.50	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{3}{16}$	9.00	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{1}{4}$	9.50	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{5}{16}$	10.00	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{3}{8}$	10.50	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{7}{16}$	11.00	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{1}{2}$	11.50	$1\frac{1}{4}$	$3\frac{3}{4}$	
$2\frac{9}{16}$	12.00	$1\frac{1}{2}$	4	No. 10
$2\frac{5}{8}$	12.75	$1\frac{1}{2}$	4	
$2\frac{11}{16}$	13.50	$1\frac{1}{2}$	4	
$2\frac{3}{4}$	14.25	$1\frac{1}{2}$	4	
$2\frac{13}{16}$	15.00	$1\frac{1}{2}$	4	
$2\frac{7}{8}$	15.75	$1\frac{1}{2}$	4	
$2\frac{15}{16}$	16.50	$1\frac{1}{2}$	4	
3	17.25	$1\frac{1}{2}$	4	
$3\frac{1}{16}$	18.00	$1\frac{3}{4}$	$4\frac{1}{2}$	No. 11
$3\frac{1}{8}$	18.75	$1\frac{3}{4}$	$4\frac{1}{2}$	
$3\frac{3}{16}$	19.50	$1\frac{3}{4}$	$4\frac{1}{2}$	

Continued on next page

These Reamers fit regular Arbors—See Page 168.

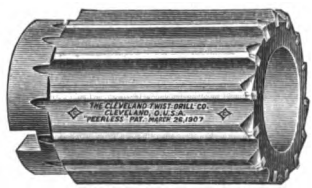
Shell Reamers have taper holes, the diameter given being at the large end.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

High Speed Reamers

No. 519—"Peerless" Shell Reamers

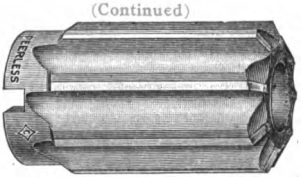
(Continued)



Patented March 26, 1907
February 15, 1910

No. 521—"Peerless" Shell Core Reamers

(Continued)



Patented March 26, 1907
February 15, 1910

Note: No. 521 not made smaller than 1 1/16 inch

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
3 1/4	$20.50	1 3/4	4 1/2	
3 5/16	21.50	1 3/4	4 1/2	
3 3/8	22.75	1 3/4	4 1/2	No 11
3 7/16	24.00	1 3/4	4 1/2	
3 1/2	25.50	1 3/4	4 1/2	
3 9/16	27.00	2	5	
3 5/8	28.50	2	5	
3 11/16	30.00	2	5	
3 3/4	31.50	2	5	No 12
3 13/16	33.00	2	5	
3 7/8	34.50	2	5	
3 15/16	36.00	2	5	
4	37.25	2	5	
4 1/16	38.50	2 1/4	5 1/2	
4 1/8	39.75	2 1/4	5 1/2	
4 3/16	41.00	2 1/4	5 1/2	
4 1/4	42.25	2 1/4	5 1/2	No. 13
4 5/16	43.50	2 1/4	5 1/2	
4 3/8	44.75	2 1/4	5 1/2	
4 7/16	46.00	2 1/4	5 1/2	
4 1/2	47.50	2 1/4	5 1/2	

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
4 9/16	$49.00	2 1/2	6	
4 5/8	50.50	2 1/2	6	
4 11/16	52.00	2 1/2	6	
4 3/4	53.50	2 1/2	6	
4 13/16	55.25	2 1/2	6	
4 7/8	57.00	2 1/2	6	
4 15/16	58.75	2 1/2	6	
5	60.50	2 1/2	6	No. 14
5 1/16	62.25	2 1/2	6	
5 1/8	64.00	2 1/2	6	
5 3/16	66.00	2 1/2	6	
5 1/4	68.00	2 1/2	6	
5 5/16	70.00	2 1/2	6	
5 3/8	72.00	2 1/2	6	
5 7/16	74.25	2 1/2	6	
5 1/2	76.50	2 1/2	6	
5 9/16	79.50	2 3/4	6 1/2	
5 5/8	82.50	2 3/4	6 1/2	
5 11/16	85.50	2 3/4	6 1/2	
5 3/4	88.50	2 3/4	6 1/2	No. 15
5 13/16	91.50	2 3/4	6 1/2	
5 7/8	95.00	2 3/4	6 1/2	
5 15/16	98.50	2 3/4	6 1/2	
6	102.00	2 3/4	6 1/2	

These Reamers fit regular Arbors—See page 168.

Shell Reamers have taper holes, the diameter given being at the large end.

A WORLD'S RECORD DRILL ON PAGE 82

No. 532—Straight Shank Arbors for "Peerless" Shell Reamers

For Code Words See Page 238

Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches	Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches
5	$3.00	⅞ to 1	9½	11	$7.50	3 1/64 to 3½	15
6	3.30	1 1/64 to 1¼	10	12	10.50	3 33/64 to 4	16
7	3.60	1 17/64 to 1⅝	11	13	13.50	4 1/64 to 4½	17
8	4.00	1 41/64 to 2	12	14	18.00	4 33/64 to 5½	18
9	4.50	2 1/64 to 2½	13	15	22.00	5 33/64 to 6	19
10	5.25	2 33/64 to 3	14				

These Arbors are regular in all respects and are identical with Arbors No. 133.

No. 533—Taper Shank Arbors for "Peerless" Shell Reamers

For Code Words See Page 238

Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches	Shank Taper
5	$3.60	⅞ to 1	9½	No. 2
6	3.95	1 1/64 to 1¼	10	No. 3
7	4.30	1 17/64 to 1⅝	11	
8	4.80	1 41/64 to 2	12	No. 4
9	5.40	2 1/64 to 2½	13	
10	6.30	2 33/64 to 3	14	
11	9.00	3 1/64 to 3½	15	
12	12.60	3 33/64 to 4	16	No. 5
13	16.20	4 1/64 to 4½	17	
14	21.60	4 33/64 to 5½	18	
15	26.40	5 33/64 to 6	19	No. 6

These Arbors are regular except that they have extra large size taper shanks to stand high speed cuts.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 535—Straight Shank Arbors for "Peerless" Expansion Shell Reamers

For Code Words See Page 238

Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches	Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches
6	$4.35	1 1/8 to 1 1/4	10	9-C	$5.55	2 25/64 to 2 1/2	13
7-A	4.65	1 17/64 to 1 7/16	11	10	6.30	2 33/64 to 3	14
7-B	4.65	1 29/64 to 1 5/8	11	11	8.75	3 1/64 to 3 1/2	15
8-A	5.10	1 41/64 to 1 13/16	12	12	11.90	3 33/64 to 4	16
8-B	5.10	1 53/64 to 2	12	13	14.90	4 1/64 to 4 1/2	17
9-A	5.55	2 1/64 to 2 3/16	13	14	19.50	4 33/64 to 5 1/2	18
9-B	5.55	2 13/64 to 2 3/8	13	15	23.60	5 33/64 to 6	19

No. 536—Taper Shank Arbors for "Peerless" Expansion Shell Reamers

For Code Words See Page 238

Size No.	Price Each	Fitting Sizes "Peerless" Shell Reamers Inches	Length Over All Inches	Shank Taper
6	$5.20	1 1/8 to 1 1/4	10	No. 3
7-A	5.60	1 17/64 to 1 7/16	11	
7-B	5.60	1 29/64 to 1 5/8	11	No. 4
8-A	6.10	1 41/64 to 1 13/16	12	
8-B	6.10	1 53/64 to 2	12	
9-A	6.65	2 1/64 to 2 3/16	13	
9-B	6.65	2 13/64 to 2 3/8	13	
9-C	6.65	2 25/64 to 2 1/2	13	
10	7.55	2 33/64 to 3	14	
11	10.50	3 1/64 to 3 1/2	15	No. 5
12	14.30	3 33/64 to 4	16	
13	17.90	4 1/64 to 4 1/2	17	
14	23.40	4 33/64 to 5 1/2	18	
15	28.35	5 33/64 to 6	19	No. 6

These Arbors have extra large size taper shanks to stand high speed cuts.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

High Speed Reamers

No. 520—"Peerless" Expansion Shell Reamers

Code Word -LOTTO

Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor	Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
1¼	$5.70	⅝	2¾	No. 6	2¼	$15.20	1¼	3¾	No. 9-B
					2 5/16	15.90	1¼	3¾	
1 5/16	6.20	¾	3	No. 7-A	2⅜	16.60	1¼	3¾	
1⅜	6.70	¾	3		2 7/16	17.30	1¼	3¾	No. 9-C
1 7/16	7.20	¾	3		2½	18.00	1¼	3¾	
					2 9/16	18.75	1½	4	
1½	7.80	¾	3	No. 7-B	2⅝	19.50	1½	4	
1 9/16	8.40	¾	3		2 11/16	20.50	1½	4	
1⅝	9.00	¾	3		2¾	21.50	1½	4	No. 10
					2 13/16	22.50	1½	4	
1 11/16	9.60	1	3½	No. 8-A	2⅞	23.75	1½	4	
1¾	10.20	1	3½		2 15/16	25.00	1½	4	
1 13/16	10.80	1	3½		3	26.25	1½	4	
					3 1/16	27.50	1¾	4½	
1⅞	11.40	1	3½	No. 8-B	3⅛	29.00	1¾	4½	
1 15/16	12.00	1	3½		3 3/16	30.50	1¾	4½	
2	12.60	1	3½		3¼	32.00	1¾	4½	No. 11
					3 5/16	33.75	1¾	4½	
2 1/16	13.20	1¼	3¾	No. 9-A	3⅜	35.50	1¾	4½	
2⅛	13.80	1¼	3¾		3 7/16	37.25	1¾	4½	
2 3/16	14.50	1¼	3¾		3½	39.00	1¾	4½	

Continued on next page

These Reamers fit Special Arbors shown on page 169.

They are not intended to ream smaller than size stamped on body—the expansive feature is designed to maintain the initial size by compensating for wear.

Special Adjusting Wrenches, with prices, are shown on page 172.

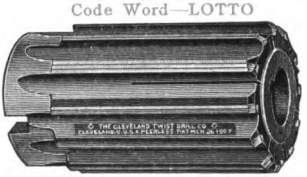
ADJUSTABLE REAMERS? "PARADOX" ON PAGE 144

High Speed Reamers

No. 520 —"Peerless" Expansion Shell Reamers

(Continued)

Code Word—LOTTO



Patented March 26, 1907
February 15, 1910

Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor	Diameter Inches	Price Each	Size Hole Inches	Length Over All Inches	Fitting Arbor
3 9/16	$41.00	2	5		4 3/4	$77.50	2 1/2	6	
3 5/8	43.00	2	5		4 13/16	80.00	2 1/2	6	
3 11/16	45.00	2	5		4 7/8	82.50	2 1/2	6	
3 3/4	47.00	2	5	No. 12	4 15/16	85.00	2 1/2	6	
3 13/16	49.00	2	5		5	87.75	2 1/2	6	
3 7/8	51.00	2	5		5 1/16	91.00	2 1/2	6	
3 15/16	52.75	2	5		5 1/8	94.50	2 1/2	6	No. 14
4	54.50	2	5		5 3/16	97.75	2 1/2	6	
4 1/16	56.00	2 1/4	5 1/2		5 1/4	101.25	2 1/2	6	
4 1/8	57.75	2 1/4	5 1/2		5 5/16	104.50	2 1/2	6	
4 3/16	59.50	2 1/4	5 1/2		5 3/8	108.00	2 1/2	6	
4 1/4	61.25	2 1/4	5 1/2	No. 13	5 7/16	111.25	2 1/2	6	
4 5/16	63.00	2 1/4	5 1/2		5 1/2	114.75	2 1/2	6	
4 3/8	64.75	2 1/4	5 1/2		5 9/16	119.00	2 3/4	6 1/2	
4 7/16	66.50	2 1/4	5 1/2		5 5/8	123.25	2 3/4	6 1/2	
4 1/2	68.25	2 1/4	5 1/2		5 11/16	127.50	2 3/4	6 1/2	
					5 3/4	131.75	2 3/4	6 1/2	No. 15
4 9/16	70.50	2 1/2	6		5 13/16	136.75	2 3/4	6 1/2	
4 5/8	72.75	2 1/2	6	No. 14	5 7/8	141.75	2 3/4	6 1/2	
4 11/16	75.00	2 1/2	6		5 15/16	146.75	2 3/4	6 1/2	
					6	151.75	2 3/4	6 1/2	

These Reamers fit Special Arbors shown on page 169.

They are not intended to ream smaller than size stamped on body—the expansive feature is designed to maintain the initial size by compensating for wear.

Special Adjusting Wrenches, with prices, are shown on page 172.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 534—Adjusting Wrenches for "Peerless" Expansion Shell Reamers

For Code Words See Page 238

Size No.	Price Each	Fitting Sizes Inches	Length Over All Inches
6	$0.40	$1\frac{1}{8}$ to $1\frac{1}{4}$	$1\frac{1}{2}$
7-A	.40	$1\frac{17}{64}$ to $1\frac{7}{16}$	$1\frac{1}{2}$
7-B	.45	$1\frac{29}{64}$ to $1\frac{5}{8}$	$1\frac{1}{2}$
8-A	.50	$1\frac{41}{64}$ to $1\frac{13}{16}$	$1\frac{5}{8}$
8-B	.55	$1\frac{53}{64}$ to 2	$1\frac{5}{8}$
9-A	.60	$2\frac{1}{64}$ to $2\frac{3}{16}$	2
9-B	.70	$2\frac{13}{64}$ to $2\frac{3}{8}$	$2\frac{1}{8}$
9-C	.80	$2\frac{25}{64}$ to $2\frac{1}{2}$	$2\frac{1}{4}$
10	.90	$2\frac{33}{64}$ to 3	$2\frac{1}{2}$
11	1.10	$3\frac{1}{64}$ to $3\frac{1}{2}$	$2\frac{3}{4}$
12	1.25	$3\frac{33}{64}$ to 4	3
13	1.45	$4\frac{1}{64}$ to $4\frac{1}{2}$	$3\frac{3}{8}$
14	1.65	$4\frac{33}{64}$ to $5\frac{1}{2}$	$3\frac{3}{4}$
15	1.90	$5\frac{33}{64}$ to 6	$3\frac{7}{8}$

These Adjusting Wrenches are of special design for use with the Expansion Shell Reamers shown on pages 170 and 171. The reamers must be removed from the arbors before adjusting. A flat bar of steel made a snug fit for the driving slot of the reamer should be gripped on edge in a vise, with enough left projecting to permit of the reamer being set on end upon it. This will prevent the reamer's turning when the wrench is inserted in the expanding plug. The reamer itself must not be gripped in the vise.

[1] "Peerless" Expanding Shell Reamers may be adjusted **in the machine** by using a special arbor with a plug short enough to permit the insertion of the adjusting wrench. Such arbors will be furnished only to order, as adjustments made out of the tool room are generally unsatisfactory.

WHEN A SET SCREW SNAPS SEE PAGE 174

Miscellaneous

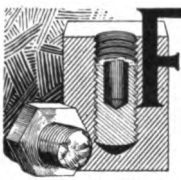
"Cleveland" Tools

Detailed Index—Pages 4 to 17

Illustrating the ease with which a broken screw may be extracted with an "EZY-OUT" Screw Extractor —the only tool expressly designed for this work.

EZY-OUT Screw Extractors

(Patented 1914)



FOR years the removal of a broken screw has been one of the meanest of all repair jobs, and in proportion to its size, it may be one of the most expensive of breaks. Heretofore its removal has often required hours of aggravating labor—principally because the mechanic has never had anything but make-shift tools for the work.

The Only Tool Designed for This Work In the EZY-OUT Screw Extractor, however, you have a tool expressly designed for the quick and easy removal of broken set and cap-screws, studs, stay-bolts, pipe fittings, etc., and the first practical solution to a problem that is as old as the screw itself.

Note the Simplicity of Operation Instead of fussing for hours with files and punches or drifts—as in the past—merely drill a hole in the broken screw (see illustration above) and insert the proper size EZY-OUT Screw Extractor—twisting it as though tapping with a left-hand tap. The twist forces EZY-OUT'S corkscrew-like spirals to *grip* the sides of the drilled hole and then, as additional force is brought to bear on the tap wrench, the screw begins to "come"—after which it is an easy matter to spin it out on its own threads just as if it had never broken off at all. (See Figure 2).

Original Threads Uninjured The simplicity of the job, when EZY-OUT is used, is in direct contrast to the aggravations accompanying the time-honored, tedious method of the past. The whole operation now need consume but a fraction of the time hitherto required, and it is *accomplished without endangering the threads of the hole.*

EZY-OUT Screw Extractors are made in 12 sizes, but for convenience and economy, these sizes are collected into handy sets, each set fitting the individual requirements of a given field of work.

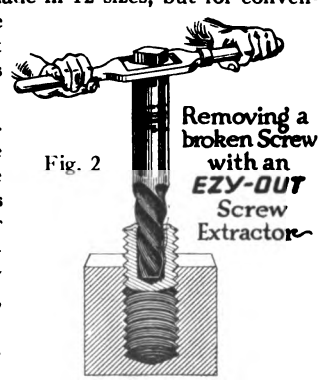


Fig. 2 Removing a broken Screw with an EZY-OUT Screw Extractor

EZY-OUT is Both Insurance and Saving As an insurance against the expensive and annoying delays caused by broken screws, EZY-OUT Screw Extractors are totally without competition. They are the only tool designed solely for this work, and they quickly repay their owner, many times over, in time, trouble, tools and production saved.

"EZY-OUT" Screw Extractors

(Patented 1914)

No. 17 Set

No. 15 Set—Designed particularly for tool-room use, comprising EZY-OUT Extractors Nos. 1, 2, 3, 4 and 5. Code word, "Parlanceda".....$3.00

No. 16 Set—Of particular interest to railroads, steel and structural workers, etc., known as "The Heavy Shop Set;" includes EZY-OUT Extractors Nos. 6, 7, 8 and 9. Code word "Parlancego".....$6.65

No. 17 Set—Utility Set for all-around use by machine shops, auto repair shops, service stations, etc. Including EZY-OUT Extractors Nos. 4, 5, and 6. Code word, "Parlancett".....$2.35

No. 15A Set—"The Garage Set" containing extractors No. 1 to 6 inclusive. Code word, "Parlancefy".....$4.00

No. 192—"EZY-OUT" Screw Extractors

Code Word—LANDTAPE

Size No.	Diameter at Small End	Diameter at Large End	Length of Flute	Length Over All	Price Each
1	1/16	1/8	1/2	2	$0.55
2	3/32	5/16	3/4	2 3/8	.60
3	1/8	1/4	1	2 11/16	.65
4	9/16	11/32	1 1/4	3	.75
5	1/4	7/16	1 1/2	3 3/8	.85
6	3/8	19/32	1 3/4	3 3/4	1.00
7	1/2	3/4	2	4 1/8	1.35
8	3/4	1 1/64	2 5/8	4 3/8	1.85
9	1	1 9/32	2 1/4	4 5/8	2.65
10	1 1/4	1 9/16	2 1/2	5	4.00
11	1 1/2	1 7/8	3	5 5/8	5.35
12	1 7/8	2 5/16	3 1/2	6 1/4	6.65

Note—The best results will be obtained by using the largest Ezy-Out Screw Extractor possible for any given screw.

SPECIAL FORD BUSHING REAMER—PAGE 137

Tools for Turret Lathes

THE TURRET LATHE TOOLS shown in the following pages were first introduced by us in 1905 and at once received the hearty endorsement of users of Turret and Screw Machines.

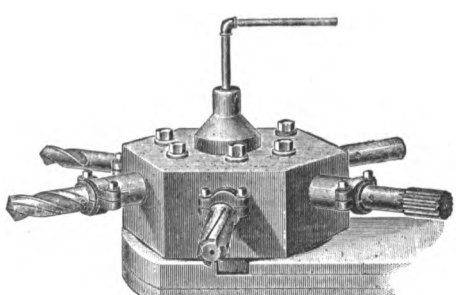
They are made in two lengths, designated as Short Set and Long Set, and all tools of the same diameter, of whatever style of body, have the same standard size shanks. This uniformity makes them completely interchangeable and minimizes the trouble and loss of time incident to setting up for a job.

To extend this interchangeability to tools of different diameters we have devised the simple and satisfactory Turret Tool Holder shown with its Split Collets (or adapters) on page 177.

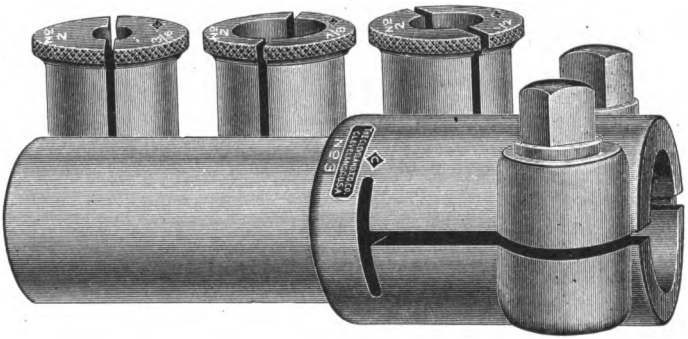
To compensate for the frequent lack of alignment between the tool socket in the turret head and the spindle, we recommend using the Floating Tool Holder, described on page 178.

Special attention is called to our "Peerless" High Speed Reamers for Turret Lathes. They will stand double the speed of carbon steel reamers and will greatly increase the output of such machines. They will be found in the latter part of the section.

Turret tools are not carried in stock, but are made to suit special requirements. Prices quoted on application.



No. 70—Turret Tool Holders
No. 72—Collets for Turret Tool Holders



The advantages of our Turret Tool Holder over the ordinary method of holding tools with various sizes and styles of shanks in turrets will be readily appreciated by all mechanics.

The **Holder** itself is made of machinery steel, drop forged, case hardened and ground both inside and outside. The clamp screws are made of tool steel and hardened. The shank of holder is made to fit turret and is held in the usual manner.

The **Spring Collets** fit in the holder and when tool is inserted and clamped it is held rigidly in a central position. The collets are split within a short distance of the back ends and when in proper position extend beyond the slot in the holder, preventing the oil from running out.

The regular style Spring Collets are intended for straight shank tools—but can be made with taper holes, if desired.

No. 70—Turret Tool Holder

For Code Words See Page 234.

Size No.	Diameter of Collet Hole Inches	Length Over All Inches	Size of Shank Inches Diameter	Length	Price Each
1	¾	5	1	2½	$5.00
2	1	6	1¼	3	6.50
3	1¼	6	1½	3	8.00

Holders of different specifications can be made to order—price on application

No. 72—Collets for Turret Tool Holders

For Straight Shank Tools Only

For Code Words See Page 234.

Size No.	Outside Diameter Inches	Diameters of Holes in Collets Inches by 64ths	Price Each
1	¾	¼ to ⅝	$2.00
2	1	$\frac{5}{16}$ to ⅞	2.25
3	1¼	⅜ to 1⅛	2.50

When ordering Collets always state Size—Number and Diameter of Holes.

Collets differing from those listed or having taper holes can be furnished on short notice. Prices on application.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Floating Tool Holders

While this Floating Tool Holder is adapted to a variety of uses, it was designed primarily to drive finishing reamers in Turret Lathes. The tool sockets, or holes in the turret heads, are frequently out of perfect alignment with the spindles of the machines, this inaccuracy often being accentuated by setting up the screws holding the tools in the head. Thus the reamed holes will be oversize or tapering. The Floating Tool Holder is self-compensating to correct this lack of alignment and enable the reamer to make a straight hole of its own diameter. The reamer should be guided by hand or some other suitable device when first entering the hole.

The Holders are strong and well made, and so constructed that the floating movement is obtained with the axis of the two members either parallel or at a slight angle. Ordinarily made without oil connections, they can be provided with side connections or an oil feed through the center at small additional expense.

They will be found very efficient when fitted to our Turret Tool Holder shown on preceding page.

No. 62A—Taper Shank Floating Tool Holders

For Code Words See Page 234

Size No.	Price Each	Size of Taper Hole No.	Size of Taper Shank No.	Length Over All Inches
1 to 2	$4.00	1	2	7¾
1 to 3	4.00	1	3	8½
1 to 4	4.00	1	4	9 11/16
2 to 2	5.00	2	2	8½
2 to 3	5.00	2	3	9¼
2 to 4	5.00	2	4	10 7/16
3 to 2	6.00	3	2	9½
3 to 3	6.00	3	3	10¼
3 to 4	6.00	3	4	11 7/16
3 to 5	6.00	3	5	12 11/16

No. 62B—Floating Tool Holders

With Shanks Fitting Turret Tool Holders

For Code Words See Page 234

Size Taper Hole No.	Fitting Turret Tool Holders No.	Length of Driving Member Inches	Price Each
1	1, 2 or 3	4⅛	$4.00
2	1, 2 or 3	4⅞	5.00
3	1, 2 or 3	5⅞	6.00

The Holders will be furnished with any style shank, and with special taper or straight holes, to order.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

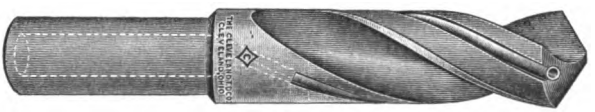
Special Oil Tube Drills and Reamers For Turret Lathes

We do not carry these tools in stock but have made large numbers to special order. Prices quoted on application.

No. 200—Oil Tube Drill, Short Set

For Turret Lathes

Code Word—LANDTAX



No. 205—Oil Tube Drill, Long Set

For Turret Lathes

Code Word—LANDWARD

No. 210—Three-Fluted Chucking Reamers, Short Set

For Turret Lathes

Code Word—LANE

No. 215—Three-Fluted Chucking Reamers, Long Set

For Turret Lathes

Code Word—LANGATE

"CORRECT CUTTING COMPOUNDS"—PAGE 96

Special Tools For Turret Lathes

No. 250—Shell Reamer Arbors, Short Set

For Turret Lathes

For Code Word See Page 237

No. 255—Shell Reamer Arbors, Long Set

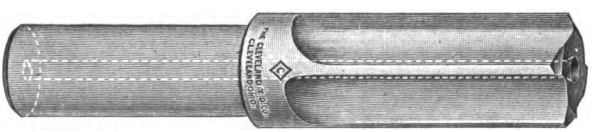
For Turret Lathes

For Code Words See Page 237

No. 220—Four-Fluted Chucking Reamers, Short Set

For Turret Lathes

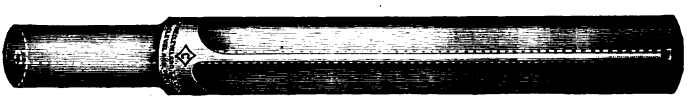
Code Word—LANGREL



No. 225—Four-Fluted Chucking Reamers, Long Set

For Turret Lathes

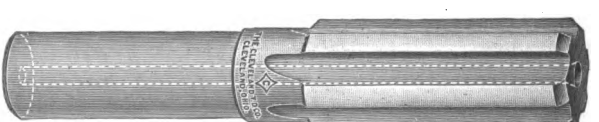
Code Word—LANGUET



No. 230—Rose Chucking Reamers, Short Set

For Turret Lathes

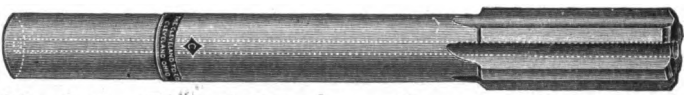
Code Word—LANGUID



Special Tools For Turret Lathes

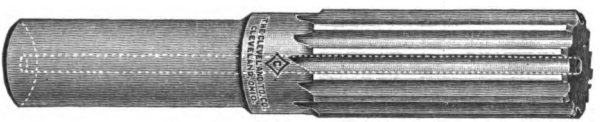
No. 235—Rose Chucking Reamers, Long Set

For Turret Lathes
Code Word—LANGUISH



No. 240—Fluted Chucking Reamers, Short Set

For Turret Lathes
Code Word—LANGUOR



(Eccentric Flutes)

No. 245—Fluted Chucking Reamers, Long Set

Code Word—LANIARY

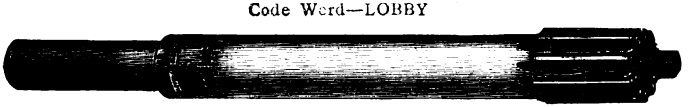
(Eccentric Flutes)

"Peerless" High Speed Reamers

Long Set

No. 506—"Peerless" Expansion Chucking Reamers

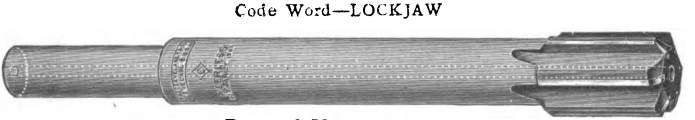
Code Word—LOBBY



Patented March 26, 1907
February 15, 1910

No. 511—"Peerless" Core Reamers

Code Word—LOCKJAW



Patented March 26, 1907
February 15, 1910

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Special Tools for Turret Lathes

No. 505—"Peerless" Chucking Reamers

Long Set

Code Word LOATHER

Patented March 26, 1907
February 15, 1910

No. 507—"Peerless" Chucking Reamers

Short Set

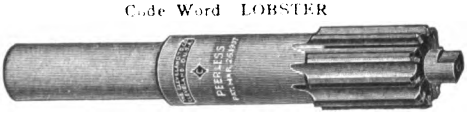
Code Word LOBULET

Patented March 26, 1907
February 15, 1910

No. 508—"Peerless" Expansion Chucking Reamers

Short Set

Code Word LOBSTER



Patented March 26,1907
February 15, 1910

The Expansion of "Peerless" Reamers takes place at the cutting end and accomplishes a double purpose. It will not only keep the reamer up to size at the point where it is most subject to wear, but will also vary the amount of longitudinal clearance according to the material to be cut, so as to prevent jamming in the hole. "Peerless" Expansion Reamers are not intended to ream smaller than the size stamped on the shank.

All styles of "Peerless" Reamers will be furnished in millimeter sizes when specified.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Special Tools for Turret Lathes

No. 512—"Peerless" Expansion Core Reamers

Long Set

Code Word—LOCUST

Patented March 26, 1907
February 15, 1910

No. 513—"Peerless" Core Reamers

Short Set

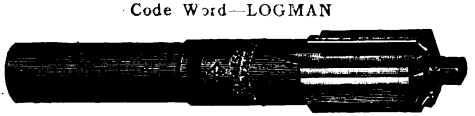
Code Word—LODGER

Patented March 26, 1907
February 15, 1910

No. 514—"Peerless" Expansion Core Reamers

Short Set

Code Word—LOGMAN



Patented March 26, 1907
February 15, 1910

"Peerless" Reamers for Turret Lathes will greatly increase the output of such machines. They will stand double the speed of carbon steel tools, and will ream more holes without regrinding. They will be furnished with or without oil holes, according to specifications.

"Peerless" Core Reamers for rough boring cored or drilled holes have heavy flutes and deep grooves. They may be end ground until entirely used up. To insure a perfectly finished hole they should be followed with a finishing reamer.

All styles of "Peerless" Reamers will be furnished in millimeter sizes when specified.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Straight Shank Counterbores

With Interchangeable Pilots

Carbon Steel No. 176
Code Word—LANDSORE

High Speed Steel No. 876
Code Word—LUSTER

Patented August 22, 1905

COUNTERBORES					PILOT SIZES				
Diameter Inches	Price Each		Length Over All Inches	Size of Shank Inches	Group Letter	For Body of Screw Inch	Tap Drill Sizes		*Minimum Size Inches	Price Each
	Carbon Steel	High Speed					V thr'd Inch	U.S. St'd Inch		
1/16	$1.70	$2.20	5 3/4	3/8x2 1/4	A	.249	.160	.169	.158	.500 in. and smaller $.50
11/64	1.75	2.25	5 3/4	3/8x2 1/4			.181	.186		
3/8	1.80	2.30	5 3/4	3/8x2 1/4						
13/64	1.90	2.40	6 1/8	1/2x2 1/4	B	.311	.233	.241	.230	
1/2	2.00	2.50	6 3/8	1/2x2 1/2		.374	.289	.301		
15/64	2.15	2.65	6 1/2	1/2x2 1/2		.436	.338	.347		
5/8	2.30	2.80	7	5/8x2 5/8						
11/64	2.45	2.95	7	5/8x2 5/8	C	.499	.396	.405	.312	.750 in. down to .500 in. $.75
3/4	2.60	3.10	7 1/4	3/4x2 3/4		.561	.452	.452		
13/64	2.80	3.30	7 1/2	3/4x2 3/4						
7/8	3.00	3.75	7 3/4	7/8x3	D	.624	.499	.514	.382	
15/64	3.25	3.80	8 1/4	7/8x3		.686	.529	.568		
1	3.50	4.25	9	1 x3		.749	.608	.624		
1 1/16	3.75	4.00	9	1 x3	E	.749	.608	.624	.455	1 inch down to .750 in. $1.00
1 1/8	4.00	4.75	9 1/4	1 1/8x3 1/4		.811	.670	.681		
1 3/16	4.50	5.50	9 1/4	1 1/8x3 1/4		.874	.717	.733		
1 1/4	5.00	6.25	9 1/2	1 1/4x3 1/2		.936	.780	.793		
1 5/16	5.50	7.00	9 1/2	1 1/4x3 1/2		.999	.827	.842		
1 3/8	6.00	8.00	9 1/2	1 1/4x3 1/2						

These Counterbores are accurately ground on centers. The Pilots have taper shanks ground to fit the taper pilot-hole in the end of the Counterbore. As the Pilots in each group are interchangeable, fitting any size Counterbore in the group, a wide variety of combinations is possible. To eject Pilots insert taper pin in drift hole provided.

*Pilot sizes listed in "Minimum Size" Column are *not stock sizes*, but simply show the *smallest pilots that can be used in* the Counterbores in each group. They will be furnished at *special prices* only.

When ordering Counterbores always specify sizes of Pilots wanted.

When ordering Pilots always give *size* and *group letter*.

WHEN A STUD SNAPS SEE PAGE 174

Taper Shank Counterbores

With Interchangeable Pilots

Carbon Steel No. 177
Code Word—LANDSOWER

High Speed Steel No. 877
Code Word—LUSTERING

Patented August 22, 1905

COUNTERBORES						PILOT SIZES				
Diameter Inches	Price Each Carbon Steel	Price Each High Speed	Length Over All Inches	Shank Taper	Group Letter	For Body of Screw Inch	Tap Drill Sizes V thr'd Inch	Tap Drill Sizes U. S. St'd Inch	*Minimum Size Inches	Price Each
1/16	$1.85	$2.50	5¾	No. 1	A	.249	.160	.169	.158	.500 in. and smaller $.50
1/8	1.95	2.65	5¾				.181	.186		
3/16	2.00	2.80	5¾							
1/4	2.10	3.10	6⅛	No. 1	B	.311	.233	.241	.230	
5/16	2.20	3.40	6⅛			.374	.289	.301		
3/8	2.35	3.80	6½			.436	.338	.347		
7/16	2.55	4.30	7	No. 2						
1/2	2.70	5.00	7	No. 2	C	.499	.396	.405	.312	.750 in. down to .500 in. $.75
9/16	2.85	5.65	7¼			.561	.452	.452		
5/8	3.10	6.40	7½							
11/16	3.30	7.20	7¾	No. 2	D	.624	.499	.514	.382	
3/4	3.55	8.00	8½	No. 3		.686	.529	.568		
1	3.85	8.75	9			.749	.608	.624		
1 1/16	4.15	9.50	9	No. 3	E	.749	.608	.624	.455	1 inch down to .750 in. $1.00
1 1/8	4.40	10.25	9¼			.811	.670	.681		
1 3/16	4.95	11.10	9¼			.874	.717	.733		
1 1/4	5.50	11.90	9½			.936	.780	.793		
1 5/16	6.05	12.70	9½			.999	.827	.842		
1 3/8	6.60	13.80	9½							

These Counterbores are accurately ground on centers. The Pilots have taper shanks ground to fit the taper pilot-hole in the end of the Counterbore. As the Pilots in each group are interchangeable, fitting any size Counterbore in the group, a wide variety of combinations is possible. To eject Pilots insert taper pin in drift hole provided.

*Pilot sizes listed in "Minimum Size" Column are *not stock sizes*, but simply show the *smallest pilots that can be used in* the Counterbores in each group. They will be furnished at *special prices* only.

When ordering Counterbores always specify sizes of Pilots wanted.

When ordering Pilots always give *size* and *group letter*.

WHEN A TANG TWISTS OFF, SEE PAGE 24

No. 85—Cleveland Combination Counterbores

Every machine shop should have a set of the Cleveland Combination Counterbores. The large part of the body is a hardened steel collar forced into place after the slot for receiving the blade is cut. The face of this collar is ground true with the shank after it is secured in place, and projects over the end of the slot. The blade is centered by a turned projection which fits into the collar and is held squarely against the ground face of the collar by the guide bushing, washer and screw. The guide bushings are hardened and slotted to fit on to the blades, and can be quickly changed for various sized holes by removing the screw shown in the end. We recommend this as the simplest, most rigid and best all-round Counterbore on the market.

For Code Words See Page 235

HOLDERS		GUIDE BUSHES		BLADES	
Without Blade or Guide Bush	Price Each	Outside Diameter Inches	Price Each	Length Inches	Price Each
No. 1 with No. 1 Taper Shank	$3.50	7/16	$0.30	7/8	$0.75
No. 1 with No. 2 Taper Shank	4.00	1/2	.30	1	.75
		9/16	.35	1 1/8	.85
		9/16	.35	1 1/4	.85
No. 2 with No. 2 Taper Shank	4.25	5/8	.40	1 3/8	.85
No. 2 with No. 3 Taper Shank	4.75	11/16	.40	1 1/2	.85
		3/4	.45	1 5/8	.95
		3/4	.45	1 5/8	.95
No. 3 with No. 3 Taper Shank	5.00	13/16	.50	1 3/4	.95
No. 3 with No. 4 Taper Shank	5.50	7/8	.50	1 7/8	.95
		15/16	.55	2	1.00
		7/8	.55	1 3/4	.95
		15/16	.60	1 7/8	1.00
No. 4 with No. 4 Taper Shank	5.75	1	.60	2	1.10
No. 4 with No. 5 Taper Shank	6.25	1 1/16	.65	2 1/8	1.20
		1 1/8	.65	2 1/4	1.30
		1 1/8	.65	2 1/4	1.40
No. 5 with No. 5 Taper Shank	6.50	1 1/4	.70	2 1/2	1.50
No. 5 with No. 6 Taper Shank	7.00	1 3/8	.75	2 3/4	1.60
		1 1/2	.75	3	1.70

The length of blades and diameters of guide bushes for these Counterbores are based on standard sizes of finished washers, which are equivalent to 2 bolt diameters plus 1/8 inch up to 7/8 inch diameter; above this size to 2 bolt diameters only.

SPECIAL—When ordering Counterbores complete state specifically **Size Number** and **Number** of Taper Shank, also **Diameter** of **Guide Bush** and **Length** of **Blade** wanted.

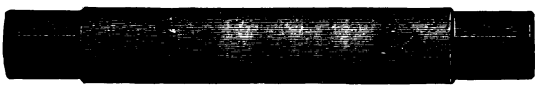
If extra parts are desired always mention size of holders for which they are intended.

We can furnish Holders with other shanks than listed, Guide Bushes of different diameters, and Blades of any length. Prices on application

ALWAYS GIVE LIST NUMBER WHEN ORDERING

No. 143—Hardened and Ground Steel Mandrels

Code Word—LANDLADY



Diameter Inches	Price Each	Length Over All Inches	Diameter Inches	Price Each	Length Over All Inches
1/4	$0.80	3 3/4	1 15/16	$6.00	10 3/4
5/16	.90	4	2	6.50	11
3/8	1.00	4 1/4	2 1/16	7.00	11 1/2
7/16	1.10	4 1/2	2 1/8	7.50	11 1/2
1/2	1.20	5	2 3/16	8.00	12
9/16	1.30	5 1/4	2 1/4	8.50	12
5/8	1.40	5 1/2	2 5/16	9.00	12
11/16	1.50	5 3/4	2 3/8	9.50	12
3/4	1.60	6	2 7/16	10.00	12 1/2
13/16	1.70	6 1/4	2 1/2	10.50	12 1/2
7/8	1.85	6 1/2	2 9/16	11.25	12 1/2
15/16	2.00	6 3/4	2 5/8	12.00	12 1/2
1	2.15	7	2 11/16	12.75	13
1 1/16	2.30	7 1/4	2 3/4	13.50	13
1 1/8	2.45	7 1/2	2 13/16	14.25	13
1 5/16	2.60	7 3/4	2 7/8	15.00	13
1 1/4	2.80	8	2 15/16	15.75	13
1 5/16	3.00	8 1/4	3	16.50	13
1 3/8	3.25	8 1/2	3 1/8	18.00	14
1 7/16	3.50	8 3/4	3 1/4	19.50	14
1 1/2	3.75	9	3 3/8	21.00	15
1 9/16	4.00	9 1/4	3 1/2	23.00	15
1 5/8	4.25	9 1/2	3 5/8	25.00	16
1 11/16	4.50	9 3/4	3 3/4	27.00	16
1 3/4	4.75	10	3 7/8	29.00	17
1 13/16	5.00	10 1/4	4	31.00	17
1 7/8	5.50	10 1/2			

These Mandrels are made of good quality tool steel, hardened and ground perfectly true, to fit holes reamed by our reamers. They are slightly tapering, and the size is stamped on the large end. They are not injured by careful driving. We recommend rawhide hammers for this purpose.

All sizes and dimensions not listed are special and subject to special prices.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

The Use and Breakage of Hollow Mills

AN investigation of a number of cases, selected at random, where Hollow Mills have broken in service without any discoverable defects, reveals, (1) that when the tool is held stationary and the work is rotated, the danger of breaking the tool is greatly increased; (2) that when the *tool is rotating* the problem is much simplified.

In every case of breakage, where the tool was held stationary and the work rotated (as is common practice in screw machine work), one or both of the following unfavorable conditions was found to exist:

(a) The tool was not accurately centered with the work, resulting in the condition shown in Fig. 1;

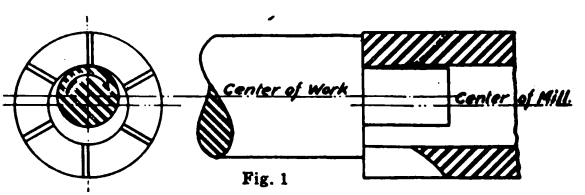


Fig. 1

(b) The tool was tilted in the holder, due to grit or a holding device worn out of true, so that the axis of the tool was at an angle to the axis

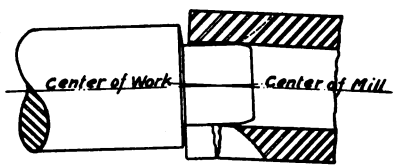


Fig. 2

of the work (Fig. 2). (This condition nearly always results from condition "a," for, when the mill begins to cut, its cutting end will be pulled in toward the center by the rotation of the work, and its axis will be forced out of line.) Fig. 2 shows what severe strains this imposes on the tool, tending to pry the teeth out of it.

When, however, the tool is rotated and the work held stationary, the above sources of trouble are eliminated. All that is then necessary is to see that the cutting end of the tool is running true. The work need not be any more carefully centered or lined up than the accuracy of the job requires, *for the mill will cut its own path in line with its own axis* and all prying strains will be eliminated.

The conclusion reached is that Hollow Mills, in order to give satisfactory service, must be properly centered and aligned with the work. These conditions can be much more easily obtained when the mill is rotating and the work held stationary, and we therefore advocate this arrangement wherever it is possible.

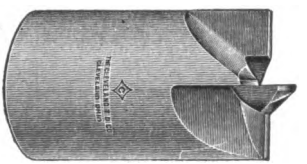
Plain Hollow Mills

Carbon Steel No. 131B

Code Word—LAMELIKE

High Speed Steel No. 660

Code Word—LUDICROUS

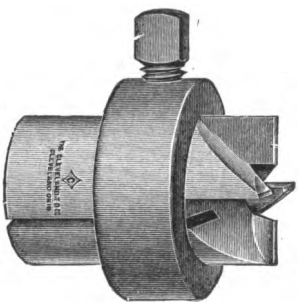


Size Hole Inches	Price Each		Outside Diameter Inches	Length Over All Inches
	Carbon Steel	High Speed		
3/32	$1.35	$2.75	5/8	1 1/2
1/8	1.35	2.75	5/8	1 1/2
5/32	1.35	2.75	5/8	1 1/2
9/16	1.35	2.75	5/8	1 1/2
7/32	1.35	2.75	5/8	1 1/2
1/4	1.35	2.75	5/8	1 1/2
9/32	2.00	3.00	3/4	1 1/2
5/16	2.00	3.00	3/4	1 1/2
11/32	2.00	3.00	3/4	1 1/2
3/8	2.70	3.25	1	1 3/4
7/16	2.70	3.25	1	1 3/4
1/2	2.70	3.25	1	1 3/4
9/16	3.00	4.25	1 1/4	2
5/8	3.00	4.25	1 1/4	2
11/16	3.35	5.25	1 1/2	2
3/4	3.35	5.25	1 1/2	2
13/16	3.35	5.25	1 1/2	2
7/8	4.00	6.50	1 3/4	2 1/4
15/16	4.00	6.50	1 3/4	2 1/4
1	4.00	6.50	1 3/4	2 1/4

WHEN A CAP SCREW SNAPS SEE PAGE 174

No. 131A—Adjustable Hollow Mills

Code Word—LAMENESS

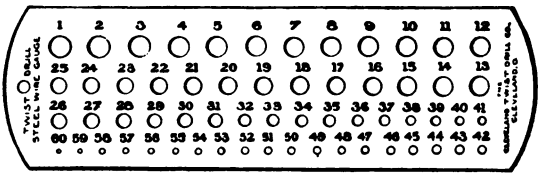


Size Hole Inches	Price Each	Outside Diameter Inches	Length Over All Inches
3/32	$1.85	5/8	1 1/2
1/8	1.85	5/8	1 1/2
5/32	1.85	5/8	1 1/2
3/16	1.85	5/8	1 1/2
7/32	1.85	5/8	1 1/2
1/4	1.85	5/8	1 1/2
9/32	2.60	3/4	1 1/2
5/16	2.60	3/4	1 1/2
11/32	2.60	3/4	1 1/2
3/8	3.50	1	1 3/4
7/16	3.50	1	1 3/4
1/2	3.50	1	1 3/4
9/16	4.00	1 1/4	2
5/8	4.00	1 1/4	2
11/16	4.60	1 1/2	2
3/4	4.60	1 1/2	2
13/16	4.60	1 1/2	2
7/8	5.50	1 3/4	2 1/4
15/16	5.50	1 3/4	2 1/4
1	5.50	1 3/4	2 1/4

DOUBLE PRODUCTION PER DOLLAR—PAGE 154

No. 119—Twist Drill and Steel Wire Gauge

Code Word—LADLOW

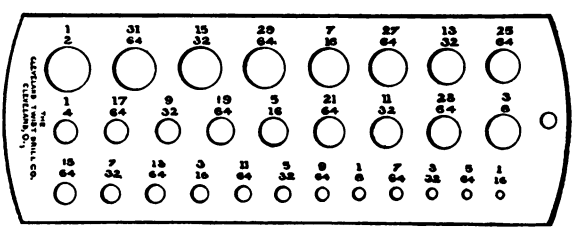


Price $1.50

Size No.	Decimal Inches	Size No.	Decimal Inches	Size No.	Decimal Inches	Size No.	Decimal Inches
1	.2280	16	.1770	31	.1200	46	.0810
2	.2210	17	.1730	32	.1160	47	.0785
3	.2130	18	.1695	33	.1130	48	.0760
4	.2090	19	.1660	34	.1110	49	.0730
5	.2055	20	.1610	35	.1100	50	.0700
6	.2040	21	.1590	36	.1065	51	.0670
7	.2010	22	.1570	37	.1040	52	.0635
8	.1990	23	.1540	38	.1015	53	.0595
9	.1960	24	.1520	39	.0995	54	.0550
10	.1935	25	.1495	40	.0980	55	.0520
11	.1910	26	.1470	41	.0960	56	.0465
12	.1890	27	.1440	42	.0935	57	.0430
13	.1850	28	.1405	43	.0890	58	.0420
14	.1820	29	.1360	44	.0860	59	.0410
15	.1800	30	.1285	45	.0820	60	.0400

No. 121—Gauge for Fractional Sized Drills

Code Word—LADROP



Price $2.25

Size Inches	Decimal	Size Inches	Decimal	Size Inches	Decimal	Size Inches	Decimal	Size Inches	Decimal
1/16	.0625	9/32	.15625	1/4	.25	11/32	.34375	7/16	.4375
5/64	.07812	11/64	.17187	17/64	.26562	23/64	.35937	29/64	.45312
3/32	.09375	3/16	.1875	9/32	.28125	3/8	.375	15/32	.46875
7/64	.10937	13/64	.20312	19/64	.29687	25/64	.39062	31/64	.48437
1/8	.125	7/32	.21875	5/16	.3125	13/32	.40625	1/2	.50
9/64	.14062	15/64	.23437	21/64	.32812	27/64	.42187		

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Straight Shank End Mills

Carbon Steel No. 184

Code Word—LANDSTAR

High Speed Steel No. 674

Code Word—LUGWORM

These End Mills are regularly furnished either right or left-hand. This cut shows a Right-Hand Mill.

	Diameter Inches	Price Each: Carbon Steel	Price Each: High Speed	Length of Cut Inches	Length Over All Inches
Furnished with Straight Flutes	1/8	$0.45	.50	3/8	1 1/4
	3/16	.55	.70	5/8	1 1/2
	1/4	.70	.90	13/16	1 7/8
	5/16	.90	1.10	7/8	1 15/16
Furnished with Spiral Flutes	3/8	1.00	1.30	7/8	2
	7/16	1.25	1.50	15/16	2 1/8
	1/2	1.60	1.70	1	2 1/4
	9/16	1.70	1.90	1 1/16	2 1/2
	5/8	1.90	2.10	1 1/4	3
	3/4	2.15	2.50	1 5/8	3 5/8

End Mills having dimensions other than listed are special and subject to special prices. When ordering always state whether **Right** or **Left** hand is wanted.

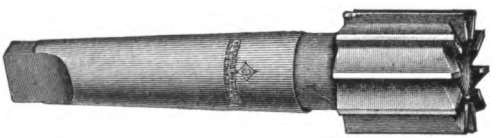
WHEN A SET SCREW SNAPS SEE PAGE 174

End Mills

Fitted with Regular Taper Shanks

Carbon Steel No. 149
Code Word—LANDLOVING

High Speed Steel No. 672
Code Word—LUGBOLT



These End Mills are regularly furnished in RIGHT-HAND. This cut shows a Right-Hand Mill.

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper No.
	Carbon Steel	High Speed			
1/4	$1.45	$1.70	1/2	3 1/2	1
5/16	1.45	1.70	1/2	3 1/2	1
3/8	1.55	1.75	5/8	3 5/8	1
7/16	1.60	1.85	5/8	3 5/8	1
7/16	1.75	2.25	3/4	4 1/4	2
1/2	1.65	1.90	3/4	3 3/4	1
1/2	1.80	2.30	7/8	4 1/2	2
9/16	1.70	2.00	3/4	3 3/4	1
9/16	2.00	2.40	7/8	4 1/2	2
5/8	2.00	2.50	7/8	4 1/2	2
11/16	2.20	2.75	7/8	4 1/2	2
3/4	2.25	2.85	1	4 5/8	2
3/4	2.50	3.45	1	5 1/4	3
7/8	2.65	3.40	1	4 5/8	2
7/8	2.85	3.75	1	5 1/4	3
1	2.70	3.60	1 1/4	5	2
1	2.90	4.00	1 1/4	5 3/4	3
1 1/8	3.00	4.25	1 1/4	5 3/4	3
1 1/4	3.10	4.65	1 1/2	6	3

End Mills having dimensions other than listed and Left-Hand End Mills are special and subject to special prices. When ordering always state whether **Right** or **Left** hand is wanted. Be sure to state shank number wanted.

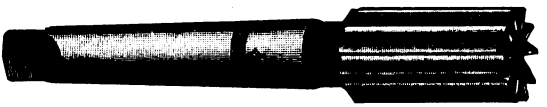
ALWAYS GIVE LIST NUMBER WHEN ORDERING

End Mills

Fitting Brown & Sharpe Collets

Carbon Steel No. 149-A
Code Word—LANDLOVIST

High Speed Steel No. 673
Code Word—LUGGAGE



These End Mills are regularly furnished in either right or left-hand. This cut shows a Left-Hand Mill.

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper No.
	Carbon Steel	High Speed			
1/4	$1.25	$1.40	1 1/16	2 7/16	4
1/4	1.45	1.70	1 1/16	3	5
5/16	1.25	1.40	7/8	2 1/2	4
5/16	1.45	1.70	7/8	3 1/16	5
3/8	1.40	1.55	7/8	2 1/2	4
3/8	1.55	1.75	7/8	3 1/16	5
7/16	1.40	1.55	1 5/16	2 9/16	4
7/16	1.60	1.80	1 5/16	3 1/8	5
1/2	1.65	1.90	1	3 3/16	5
1/2	1.80	2.40	1 1/8	5 1/8	7
9/16	1.70	2.00	1 1/16	3 1/4	5
9/16	2.00	2.50	1 1/4	5 1/4	7
5/8	1.80	2.20	1 1/4	3 7/16	5
5/8	2.15	2.80	1 1/2	5 1/2	7
11/16	2.20	2.85	1 1/2	5 1/2	7
3/4	2.25	2.95	1 5/8	5 5/8	7
3/4	2.50	3.85	1 5/8	6 7/8	9
7/8	2.65	3.55	1 3/4	5 3/4	7
7/8	2.85	4.25	1 3/4	7	9
1	2.70	3.80	1 7/8	5 7/8	7
1	2.90	4.35	1 7/8	7 1/8	9
1 1/8	2.85	4.20	2	6	7
1 1/8	3.00	4.60	2	7 1/4	9
1 1/4	2.85	4.45	2	6	7
1 1/4	3.25	5.10	2	7 1/4	9
1 3/8	3.45	6.25	2 1/8	7 3/8	9
1 1/2	3.80	6.85	2 1/4	7 1/2	9

End Mills having dimensions other than listed are special and subject to special prices. When ordering always state whether **Right** or **Left** hand is wanted. Be sure to state shank number wanted.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

Spiral-Fluted End Mills

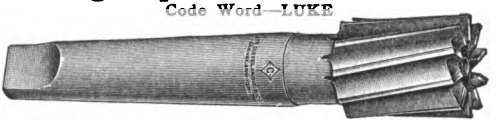
Fitted with Regular Taper Shanks

Carbon Steel No. 185

Code Word—LANDSUDS

High Speed Steel No. 675

Code Word—LUKE



These End Mills are regularly furnished in RIGHT-HAND. This cut shows a Right-Hand Mill.

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper No.
	Carbon Steel	High Speed			
1/4	$1.45	$1.70	1/2	3 1/2	1
5/16	1.45	1.70	1/2	3 1/2	1
3/8	1.55	1.75	5/8	3 5/8	1
7/16	1.60	1.85	5/8	3 5/8	1
7/16	1.75	2.25	3/4	4 1/4	2
1/2	1.65	1.90	3/4	3 3/4	1
1/2	1.80	2.30	7/8	4 1/2	2
9/16	1.70	2.00	3/4	3 3/4	1
9/16	2.00	2.40	7/8	4 1/2	2
5/8	2.00	2.50	7/8	4 1/2	2
11/16	2.20	2.75	7/8	4 1/2	2
3/4	2.25	2.85	1	4 5/8	2
3/4	2.50	3.45	1	5 1/4	3
7/8	2.65	3.40	1	4 5/8	2
7/8	2.85	3.75	1	5 1/4	3
1	2.70	3.60	1 1/4	5	2
1	2.90	4.00	1 1/4	5 3/4	3
1 1/8	3.00	4.25	1 1/4	5 3/4	3
1 1/4	3.10	4.65	1 1/2	6	3
1 1/4	3.25	5.00	1 1/2	7 3/16	4
1 3/8	3.35	5.20	1 1/2	6	3
1 3/8	3.45	5.60	1 1/2	7 3/16	4
1 1/2	3.45	5.65	1 1/2	6	3
1 1/2	3.80	6.25	1 1/2	7 3/16	4

End Mills having dimensions other than listed and Left-Hand end mills are special and subject to special prices. When ordering always state whether **Right** or **Left** hand is wanted. Be sure to state the shank number wanted.

"PEERLESS" PUTS THE COST WHERE IT COUNTS

Spiral-Fluted End Mills

Fitting Brown & Sharpe Collets

Carbon Steel No. 186

Code Word—LANDSYRUP

High Speed Steel No. 676

Code Word—LUKEWARM

These End Mills are regularly furnished in either right or left hand. This cut shows a Right-Hand Mill.

Diameter Inches	Price Each		Length of Flute Inches	Length Over All Inches	Shank Taper No.
	Carbon Steel	High Speed			
1/4	$1.25	$1.40	13/16	2 7/16	4
1/4	1.45	1.70	13/16	3	5
5/16	1.25	1.40	7/8	2 1/2	4
5/16	1.45	1.70	7/8	3 1/16	5
3/8	1.40	1.55	7/8	2 1/2	4
3/8	1.55	1.75	7/8	3 1/16	5
7/16	1.40	1.55	15/16	2 9/16	4
7/16	1.60	1.80	15/16	3 1/8	5
1/2	1.65	1.90	1	3 3/16	5
1/2	1.80	2.40	1 1/8	5 1/8	7
9/16	1.70	2.00	1 1/16	3 1/4	5
9/16	2.00	2.50	1 1/4	5 1/4	7
5/8	1.80	2.20	1 1/4	3 7/16	5
5/8	2.15	2.80	1 1/2	5 1/2	7
11/16	2.20	2.85	1 1/2	5 1/2	7
11/16	2.40	3.75	1 1/2	6 3/4	9
3/4	2.25	2.95	1 5/8	5 5/8	7
3/4	2.50	3.85	1 5/8	6 7/8	9
7/8	2.65	3.55	1 3/4	5 3/4	7
7/8	2.85	4.25	1 3/4	7	9
1	2.70	3.80	1 7/8	5 7/8	7
1	2.90	4.35	1 7/8	7 1/8	9
1 1/8	2.85	4.20	2	6	7
1 1/8	3.00	4.60	2	7 1/4	9
1 1/4	2.85	4.45	2	6	7
1 1/4	3.25	5.10	2	7 1/4	9
1 3/8	3.45	6.25	2 1/8	7 3/8	9
1 1/2	3.80	6.85	2 1/4	7 1/2	9

End Mills having dimensions other than listed are special and subject to special prices. When ordering always state whether **Right** or **Left** hand is wanted. Be sure to state the shank number wanted.

FOR IDEAL MACHINE REAMERS SEE PAGE 154

Patent Arbors for Shell End Mills

Patented December 15, 1908

These Arbors are unique in that they will drive either righthand or lefthand End Mills with equal facility. Their construction is similar to that of the Arbors shown on page 111. The collar is moveably attached to the body, into which the driving keys, integral with the collar, are longitudinally mortised. By means of a nut, back of the collar, the latter may be moved forward on the body in such a way as to start the Shell Tool from the Arbor. Of course this can only be accomplished after the retaining screw has been removed from the end of the Arbor.

No. 195—Arbors for Shell End Mills

With Morse Taper Shank

For Code Words See Page 237

Size Arbor No.	Price Each	Fitting Sizes Inches	Shank Taper No.	Size Arbor No.	Price Each	Fitting Sizes Inches	Shank Taper No.
5	$5.40	1¼ to 1 7/16	2	7	$6.30	1¾ to 2⅛	4
5A	5.40	1¼ to 1 7/16	3	8	6.60	2¼ to 2½	4
6A	6.30	1½ to 1 11/16	4	9A	7.80	2 5/8 to 3	5

These Arbors will drive either Right-Hand or Left-Hand Mills.

No. 196—Arbors for Shell End Mills

With Brown & Sharpe Shank

For Code Words See Page 237

Size Arbor No.	Price Each	Fitting Sizes Inches	Shank Taper No.	Size Arbor No.	Price Each	Fitting Sizes Inches	Shank Taper No.
5	$5.40	1¼ to 1 7/16	7	7A	$6.60	1¾ to 2⅛	10
5A	5.40	1¼ to 1 7/16	9	8	6.30	2¼ to 2½	9
6	5.70	1½ to 1 11/16	9	8A	6.90	2¼ to 2½	10
6A	6.30	1½ to 1 11/16	10	9	7.50	2 5/8 to 3	10
7	6.00	1¾ to 2⅛	9	9A	7.80	2 5/8 to 3	11

Above Arbors will drive either Right-Hand or Left-Hand Mills.

ALWAYS GIVE LIST NUMBER WHEN ORDERING

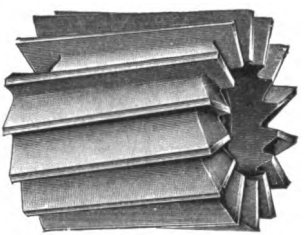
Spiral-Fluted Shell End Mills

Carbon Steel No. 188

Code Word—LANDTABLE

High Speed Steel No. 671

Code Word—LUG



Shell End Mills with straight flutes or those having dimensions other than listed are special and subject to special prices. This cut shows a Right-Hand Mill.

Diameter Inches	Price Each		Length of Cut Inches	Size Hole Inches	Diameter Inches	Price Each		Length of Cut Inches	Size Hole Inches
	Carbon Steel	High Speed				Carbon Steel	High Speed		
1¼	$3.90	$4.50	1¼	½	1 11/16	$5.45	$6.85	1¾	¾
1 5/16	4.00	4.55	1¼	½	2	5.45	7.05	1¾	¾
1⅜	4.00	4.60	1¼	½	2⅛	5.60	7.25	1¾	¾
1 7/16	4.10	4.70	1¼	½	2¼	6.20	8.55	2	1
1½	4.10	4 80	1½	⅝	2⅜	6.35	8.85	2	1
1 9/16	5.00	6.00	1½	⅝	2½	6.50	9.15	2	1
1⅝	5.00	6.15	1½	⅝	2⅝	6.80	9.75	2¼	1¼
1 11/16	5.15	6.30	1½	⅝	2¾	7.15	10.40	2¼	1¼
1¾	5.15	6.45	1¾	¾	2⅞	7.55	11.00	2¼	1¼
1 13/16	5.30	6.60	1¾	¾	3	8.00	11.75	2¼	1¼
1⅞	5.30	6.70	1¾	¾					

No. 188 and No. 671 Shell End Mills are regularly furnished either right or left hand.

These End Mills have taper holes of same taper as Shell Reamers but will not fit our Shell Reamer Arbors on account of the difference in length. They should be used on our Patent Shell End Mill Arbors, on opposite page.

When ordering always state whether Right or Left hand is wanted.

WHAT IS "BRAZO-HARDENING"—SEE PAGE 154

Suggestions on Special Tools

WE stand ready at all times to be of every possible assistance to our customers, and we are always prepared to devote a portion of our manufacturing facilities to the making of such special tools as the requirements of their particular work may demand.

Often, however, we find that a "special" is ordered when its use and additional cost might well be avoided —either by substituting one of the regular tools from our large line, or possibly a combination of them. To illustrate:

Are Larger-Than-Standard Shanks Necessary? One of the most common "specials" to come under our observation is the larger-than-standard taper shank. At times, this extra-size shank may be not only desirable but quite necessary. More often, however, experience leads us to believe that the larger-than-standard shank is a needless item of expense.

For the sake of illustration, take a $\frac{1}{64}$-inch high speed drill, with a larger-than-standard taper shank. To make this drill, a steel bar slightly larger than the extra-size shank, and very considerably larger than the finished drill flutes, must be used; yet only a comparatively small part of this bar appears in the completed tool—the balance being cut away to bring the flutes down to correct size. In this operation an appreciable amount of high speed steel is wasted, and this waste, plus the additional time involved in cutting down the bar and the other extraordinary operations involved, add enormously to the normal cost of the drill. Yet this extra cost would be entirely justifiable, *if there were no more economical method* of obtaining the desired extra driving strength.

In our estimation, however, there *is* a more economical method of obtaining this additional driving strength. Our suggestion, we are aware, will not fit all cases, but, in a surprising number of in-

stances, you will find the combination of "Cleveland" double-tanged drills and "Perfect Double-Tang" sockets a highly desirable, efficient and economical substitute for the larger-than-standard taper shank.

All "Cleveland" taper shank drills may be had with double tangs at no extra cost, and the cost of the "Perfect Double-Tang" socket, when compared with the cost of the larger-than-standard shank is inconsiderable. Even if you had to buy a "Perfect Double-Tang" socket for each individual drill, which you don't, the additional per drill, in the case under consideration, would be less than half the extra cost exacted by a larger-than-standard shank.

Each drill, however, will not require a separate socket, in fact a single "Perfect Double-Tang" socket will outlast a hundred drills. Therefore, in fairness to the socket, pro-rate its cost over the number of drills it will serve and the additional cost of the socket per drill practically fades out of existence entirely.

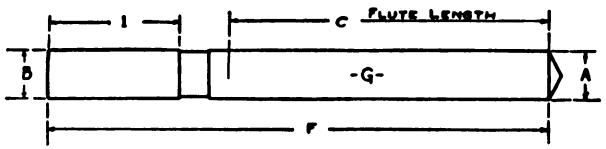
On the smaller size drills, the extent of the saving per drill through the use of "Perfect Double-Tang" sockets and "Cleveland" double-tang drills will not be so great, but the saving on a year's supply will be an item of considerable interest and importance. Throughout, the combination of "Perfect Double-Tang" sockets and double-tang drills offers the user the same and possibly an even greater driving strength and freedom from breakage than does the larger-than-standard shank.

This fact in conjunction with the economy of the suggested method enables us to recommend it with the certain feeling that only a test will be necessary to prove its merit and economy for your individual needs.

In this connection you will be interested to know of one of the features peculiar to "Perfect Double-Tang" Sockets—a feature which adds greatly to its utility and economy. "Perfect Double-Tang" Sockets not only fit any hole having a regular Morse taper but they fit or nest into *each other* as well. This unique advantage enables a shop, when supplied with a set of "Perfect Double-Tang" Sleeves or Sockets, to dispense with all other types.

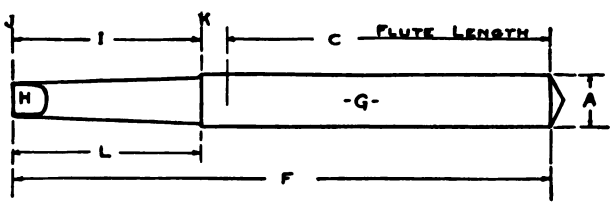
Suggestions for Ordering Special Drills

Straight Shank



A Diameter of fluted section.
B Diameter of Shank.
C Length of fluted section.
F Length over all.
G Kind of flute—refer to catalog and give list number for general style of tool.
I Length of shank.

Taper Shank

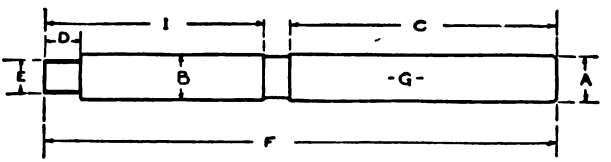


A Diameter of fluted section.
C Length of fluted section.
F Length over all.
G Kind of flute—refer to catalog and give list number for style of tool.
H If Special Tang, give dimensions both ways. Unless specified will not put on tang.
I If Regular Taper Shank, give **Size Number.** For measurements of Taper Shanks, see pages 19 and 205.
J, K, L **If Special Taper Shank,** give **Length** and diameters both **Small** and **Large** ends, or at small end and taper per foot. We would suggest, however, that sample or gauge be furnished if possible.

Special—For fractional parts of inch we prefer that the decimal be given as we use micrometer calipers throughout the factory.

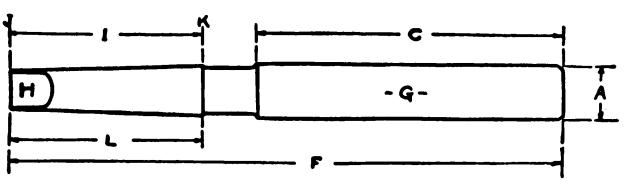
Suggestions for Ordering Special Reamers

Straight Shank



A Diameter of fluted section.
B Diameter of shank.
C Length of fluted section.
D Length of square of shank. } If not wanted, mention "No square
E Size of square of shank. } on shank."
F Length over all.
G Kind of flute—refer to catalog and give list number for style of tool.
I Length of shank.

Taper Shank



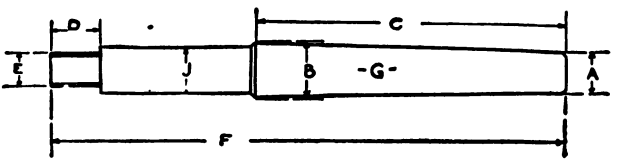
A Diameter of fluted section.
C Length of fluted section.
F Length over all.
G Kind of flute—refer to catalog and give list number for style of tool.
H If Special Tang, give dimensions both ways. Unless specified will not put on tang.
I If Regular Taper Shank, give **Size Number.** For measurements of Taper Shanks, see pages 19 and 205.
J, K, L **If Special Taper Shank,** give **Length** and diameters both **Small** and **Large** ends, or at small end and taper per foot. We would suggest, however, that sample or gauge be furnished if possible.

Special—For fractional parts of inch we prefer that the decimal be given as we use micrometer calipers throughout the factory.

For ordering Special Taper Reamers, see page 204.

Suggestions for Ordering Special Taper Reamers

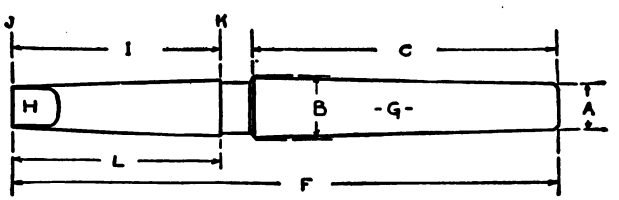
Straight Shank



A Diameter at Small End of Flute.
B Diameter at Large End of Flute.
} If both diameters cannot be given, specify either one—making mention whether at large or small end—in which case give taper per foot.

C Length of fluted section.
D Length of square of shank.
E Size of square of shank.
} If not wanted, mention "No square on shank."
F Length over all.
G Kind of flute—refer to catalog and give list number for style of tool.
J Diameter of shank.

Taper Shank

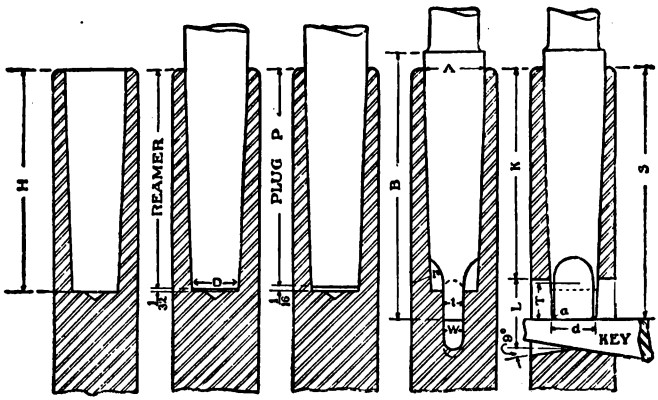


A Diameter at small end
B Diameter at large end
} In case both diameters cannot be given, specify either one—making mention whether at small or large end—in which case give taper per foot.

C Length of fluted section.
F Length over all.
G Kind of flute—refer to catalog and give list number for style of tool.
H If Special Tang, give dimensions both ways. Unless specified will not put on tang.
I If regular Taper Shank, give **Size Number.** For measurements of Taper Shanks, see pages 19 and 205.
J
K
L
} **If Special Shank,** give **Length** and diameters both **Small** and **Large** ends, or at small end and taper per foot. We would suggest, however, that sample or gauge be furnished if possible.

Special—For fractional parts of inch we prefer that the decimal be given as we use micrometer calipers throughout the factory.

Cleveland Tapers



DETAIL DIMENSIONS

Number of Taper	Dia. of Plug at Small End	Standard Plug Depth	Depth of Hole	End of Socket to Keyway	Length of Keyway	Width of Keyway	Length of Tongue	Dia. of Shank at Small End	Thickness of Tongue	Radius of Mill for Tongue	Radius of Tongue "a"	Shank Depth	Whole Length of Shank	Taper per Foot	Dia. at End of Socket	Taper per Inch	No. of Key
	D	P	H	K	L	W	T	d	t	r	a	S	B		A		
0	.252	2	2 1/32	1 13/16	9/16	.160	1/4	.235	5/32	5/32	.04	2 7/32	2 13/32	.625	.356	.05208	
1	.369	2 3/8	2 3/16	2 1/16	3/4	.213	3/8	.353	13/64	3/8	.05	2 7/16	2 11/16	.600	.475	.05	1
2	.572	2 9/16	2 5/8	2.488	7/8	.265	7/16	.553	1/4	3/8	1/16	2 15/16	3 3/16	.602	.700	.05016	2
3	.778	3 3/16	3 1/4	3 1/16	1 1/16	.330	9/16	.753	5/16	7/16	3/32	3 11/16	3 15/16	.602	.938	.05016	3
4	1.02	4 1/16	4 1/8	3 7/8	1 1/4	.490	5/8	.991	13/32	7/16	3/32	4 5/8	5 1/16	.623	1.231	.05191	4
5	1.475	5 3/16	5 1/4	4 13/16	1 1/2	.650	3/4	1.440	5/8	1/2	1/8	5 7/8	6 3/8	.630	1.748	.0525	4
6	2.116	7 1/4	7 3/8	7	1 3/4	.780	1	2.064	3/4	11/16	1/8	8 1/4	8 3/4	.626	2.494	.05216	4

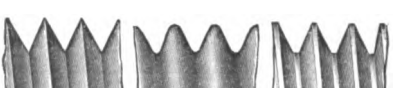
For Socket Reamers see page 133.

The U. S. Standard System of Bolts and Nuts

As recommended by the Franklin Institute, of Philadelphia December 15, 1864

Diameter of Bolt Inches	No. of Threads per Inch	Diameter of Hole in Nut Inches	Short Diameter of Nut* Inches	Diameter of Bolt Inches	No. of Threads per Inch	Diameter of Hole in Nut Inches	Short Diameter of Nut* Inches
1/4	20	.185	1/2	2	4 1/2	1.712	3 1/8
5/16	18	.240	19/32	2 1/4	4 1/2	1.962	3 1/2
3/8	16	.294	11/16	2 1/2	4	2.175	3 7/8
7/16	14	.344	25/32	2 3/4	4	2.425	4 1/4
1/2	13	.400	7/8	3	3 1/2	2.628	4 5/8
9/16	12	.454	31/32	3 1/4	3 1/2	2.878	5
5/8	11	.507	1 1/16	3 1/2	3 1/4	3.100	5 3/8
3/4	10	.620	1 1/4	3 3/4	3	3.317	5 3/4
7/8	9	.731	1 7/16	4	3	3.566	6 1/8
1	8	.837	1 5/8	4 1/4	2 7/8	3.825	6 1/2
1 1/8	7	.940	1 13/16	4 1/2	2 3/4	4.027	6 7/8
1 1/4	7	1.065	2	4 3/4	2 5/8	4.255	7 1/4
1 3/8	6	1.160	2 3/16	5	2 1/2	4.480	7 5/8
1 1/2	6	1.284	2 3/8	5 1/4	2 1/2	4.730	8
1 5/8	5 1/2	1.389	2 9/16	5 1/2	2 3/8	5.053	8 3/8
1 3/4	5	1.490	2 3/4	5 3/4	2 3/8	5.203	8 3/4
1 7/8	5	1.615	2 15/16	6	2 1/4	5.423	9 1/8

*Or size of wrench.



V-Thread Whitworth U. S. Standard

Drill List for Pipe Taps

Diameter of Tap or Size of Pipe Inches	Diameter of Drill Inches	Diameter of Tap or Size of Pipe Inches	Diameter of Drill Inches
1/8	21/64	1 1/4	1 15/32
1/4	29/64	1 1/2	1 23/32
3/8	19/32	2	2 3/16
1/2	23/32	2 1/2	2 11/16
3/4	15/16	3	3 5/16
1	1 3/16	3 1/2	3 13/16

Drill List for Taps with V-Threads

Diameter of Tap Inches	Threads per Inch	Size of Drill	Diameter of Tap Inches	Threads per Inch	Size of Drill	Diameter of Tap Inches	Threads per Inch	Size of Drill
5/32	48	50	13/32	16	P	31/32	9	13/16
5/32	56	49	13/32	18	21/64	1	8	13/64
5/32	60	48	7/16	14	R	1 1/32	8	15/64
7/64	32	50	7/16	16	S	1 1/16	8	17/64
7/64	36	49	15/32	14	3/8	1 3/32	8	19/64
7/64	40	47	15/32	16	W	1 1/8	7	19/64
1/8	32	44	1/2	12	25/64	1 1/8	8	21/64
1/8	36	43	1/2	13	X	1 5/32	7	21/64
1/8	40	42	1/2	14	13/32	1 5/32	8	23/64
9/64	30	41	17/32	12	27/64	1 3/16	7	23/64
9/64	32	40	17/32	13	27/64	1 3/16	8	1 1/64
9/64	36	37	17/32	14	7/16	1 7/32	7	1 1/64
5/32	30	33	9/16	12	29/64	1 7/32	8	1 3/64
5/32	32	32	9/16	14	15/32	1 1/4	7	1 3/64
5/32	36	31	19/32	12	31/64	1 9/32	7	1 5/64
3/16	24	29	19/32	14	1/2	1 5/16	7	1 7/64
3/16	30	27	5/8	10	31/64	1 11/32	7	1 9/64
3/16	32	27	5/8	11	1/2	1 3/8	6	1 1/8
7/32	24	20	5/8	12	33/64	1 13/32	6	1 5/32
7/32	30	16	21/32	10	33/64	1 7/16	6	1 3/16
7/32	32	15	21/32	11	17/32	1 15/32	6	1 7/32
1/4	18	17	21/32	12	35/64	1 1/2	6	1 17/64
1/4	20	14	3/4	10	39/64	1 17/32	6	1 19/64
1/4	24	9	3/4	11	5/8	1 5/8	5	1 21/64
9/32	18	13/64	3/4	12	41/64	1 21/32	5	1 23/64
9/32	20	3	25/32	10	41/64	1 3/4	5	1 25/64
5/16	16	1	25/32	11	21/32	1 25/32	5	1 27/64
5/16	18	15/64	25/32	12	43/64	1 13/16	5	1 29/64
5/16	20	E	13/16	10	43/64	1 27/32	5	1 31/64
11/32	16	F	27/32	10	45/64	1 7/8	4 1/2	1 33/64
11/32	18	17/64	7/8	9	23/32	1 29/32	4 1/2	1 35/64
3/8	14	J	7/8	10	47/64	1 15/16	4 1/2	1 37/64
3/8	16	L	29/32	9	3/4	1 31/32	4 1/2	1 41/64
3/8	18	19/64	29/32	10	49/64	2	4 1/2	1 43/64
13/32	14	N	15/16	9	25/32			

COD

Drill List for Taps with U. S. Standard Threads

Size of Tap Inches	Threads per Inch	Size of Drill Inches	Size of Tap Inches	Threads per Inch	Size of Drill Inches	Size of Tap Inches	Threads per Inch	Size of Drill Inches
1/4	20	5/16	7/8	9	47/64	1 7/8	5	1 5/8
5/16	18	C	1	8	27/32	2	4 1/2	1 23/32
3/8	16	N	1 1/8	7	31/64	2 1/8	4 1/2	1 27/32
7/16	14	S	1 1/4	7	1 5/64	2 1/4	4 1/2	1 31/32
1/2	13	13/32	1 3/8	6	1 11/64	2 3/8	4	2 1/16
9/16	12	29/64	1 1/2	6	1 19/64	2 1/2	4	2 3/16
5/8	11	33/64	1 5/8	5 1/2	1 25/64			
3/4	10	5/8	1 3/4	5	1 1/2			

For Machine Screw Taps

Size of Tap	Size of Drillfor Outside Diam. of Screw	Size of Drillfor Tapping Hole	Size of Tap	Size of Drillfor Outside Diam. of Screw	Size of Drillfor Tapping Hole	Size of Tap	Size of Drillfor Outside Diam. of Screw	Size of Drillfor Tapping Hole
2x48	44	50	9x24	16	30	16x16	I	12
2x56		49	9x28		28	16x18		8
2x64		48	9x30		28	16x20		7
			9x32		26			
3x40	39	49				17x16	L	8
3x48		47	10x24	11	26	17x18		4
3x56		45	10x30		24	17x20		3
			10x32		24			
4x32	33	46				18x16	19/64	2
4x36		44	11x24	6	21	18x18		2
4x40		43	11x28		20	18x20		1
			11x30		19	19x16	5/16	1
5x30	1/8	43				19x18		B
5x32		42	12x20	7/32	24	19x20	P	C
5x36		41	12x22		20	20x16		C
5x40		38	12x24		19	20x18		E
			12x28		18	20x20		F
6x30	28	38				22x16	S	H
6x32		37	13x20	15/64	17	22x18		J
6x36		36	13x22		17			
6x40		35	13x24		15	24x14	3/8	L
						24x16		M
						24x18		N
7x28	24	34	14x20	1/4	15	26x14	13/32	O
7x30		33	14x22		11	26x16		P
7x32		32	14x24		10			
			15x18	F	12	28x14	7/16	R
8x24	19	31	15x20		10	28x16		S
8x30		31	15x22		8	30x14	29/64	U
8x32		30	15x24		7	30x16		V

Tap Drill Sizes for Taps of A. L. A. M. Standard

Size of Tap Inches	U. S. Threads per Inch	Size of Drill Inches	Size of Tap Inches	U. S. Threads per Inch	Size of Drill Inches
1/4	28	7/32	5/8	18	35/64
5/16	24	17/64	11/16	16	11/32
3/8	24	21/64	3/4	16	13/32
7/16	20	3/8	7/8	14	11/32
1/2	20	7/16	1	14	15/32
9/16	18	1/2			

Decimal Equivalents of Regular Sizes

Decimal	Inch	Wire	m/m	Decimal	Inch	Wire	m/m	Decimal	Inch	Wire	m/m
.0135		80		.0313	1/32			.0472			1.2
.0145		79		.0315			.8	.0492			1.25
.0156	1/64			.0320		67		.0512			1.3
.0160		78		.0330		66		.0520		55	
.0180		77		.0350		65		.0550		54	
.0197			.5	.0354			.9	.0551			1.4
.0200		76		.0360		64		.0591			1.5
.0210		75		.0370		63		.0595		53	
.0225		74		.0380		62		.0625	1/16		
.0236			.6	.0390		61		.0629			1.6
.0240		73		.0394			1.	.0635		52	
.0250		72		.0400		60		.0669			1.7
.0260		71		.0410		59		.0670		51	
.0276			.7	.0420		58		.0689			1.75
.0280		70		.0430		57		.0700		50	
.0292		69		.0433			1.1	.0709			1.8
.0295			.75	.0465		56		.0730		49	
.0310		68		.0469	3/64			.0748			1.9

Decimal Equivalents of Regular Sizes

Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm	Decimal	Inch	Wire	mm
.0760		48		.1250	1/8			.1771			4.5
.0781	5/64			.1260			3.2	.1800		15	
.0785		47		.1280			3.25	.1811			4.6
.0787			2.	.1285		30		.1820		14	
.0810		46		.1299			3.3	.1850		13	4.7
.0820		45		.1339			3.4	.1870			4.75
.0827			2.1	.1360		29		.1875	3/16		
.0860		44		.1378			3.5	1890		12	4.8
.0866			2.2	.1405		28		.1910		11	
.0886			2.25	.1406	9/64			.1929			4.9
.0890		43		.1417			3.6	.1935		10	
.0905			2.3	.1440		27		.1960		9	
.0935		42		.1457			3.7	.1968			5.
.0937	3/32			.1470		26		.1990		8	
.0945			2.4	.1477			3.75	.2008			5.1
.0960		41		.1495		25		.2010		7	
.0980		40		.1496			3.8	.2031	13/64		
.0984			2.5	.1520		24		.2040		6	
.0995		39		.1535			3.9	.2047			5.2
.1015		38		.1540		23		.2055		5	
.1024			2.6	.1562	5/32			.2067			5.25
.1040		37		.1570		22		.2087			5.3
.1063			2.7	.1575			4.	.2090		4	
.1065		36		.1590		21		.2126			5.4
.1083			2.75	.1610		20		.2130		3	
.1093	7/64			.1614			4.1	.2165			5.5
.1100		35		.1654			4.2	.2187	7/32		
.1102			2.8	.1660		19		.2205			5.6
.1110		34		.1674			4.25	.2210		2	
.1130		33		.1693			4.3	.2244			5.7
.1142			2.9	.1695		18		.2264			5.75
.1160		32		.1719	11/64			.2280		1	
.1181			3.	.1730		17		.2283			5.8
.1200		31		.1732			4.4	.2323			5.9
.1220			3.1	.1770		16					

Decimal Equivalents of Regular Sizes

Decimal	Inch	Letter	m/m	Decimal	Inch	Letter	m/m	Decimal	Inch	m/m
.2340		A		.3320		Q		.5625	9/16	
.2344	15/64			.3346			8.5	.5709		14.5
.2362			6.	.3386			8.6	.5781	37/64	
.2380		B		.3390		R		.5906		15.
.2401			6.1	.3425			8.7	.5937	19/32	
.2420		C		.3437	11/32			.6094	39/64	
.2441			6.2	.3445			8.75	.6102		15.5
.2460		D		.3465			8.8	.6250	5/8	
.2461			6.25	.3480		S		.6299		16.
.2480			6.3	.3504			8.9	.6406	41/64	
.2500	1/4	E		.3543			9.	.6496		16.5
.2520			6.4	.3580		T		.6562	21/32	
.2559			6.5	.3583			9.1	.6693		17.
.2570		F		.3594	23/64			.6719	43/64	
.2598			6.6	.3622			9.2	.6875	11/16	
.2610		G		.3642			9.25	.6890		17.5
.2638			6.7	.3661			9.3	.7031	45/64	
.2656	17/64			.3680		U		.7087		18.
.2658			6.75	.3701			9.4	.7187	23/32	
.2660		H		.3740			9.5	.7283		18.5
.2677			6.8	.3750	3/8			.7344	47/64	
.2716			6.9	.3770		V		.7480		19.
.2720		I		.3780			9.6	.7500	3/4	
.2756			7.	.3819			9.7	.7656	49/64	
.2770		J		.3839			9.75	.7677		19.5
.2795			7.1	.3858			9.8	.7812	25/32	
.2811		K		.3860		W		.7874		20.
.2812	9/32			.3898			9.9	.7969	51/64	
.2835			7.2	.3906	25/64			.8071		20.5
.2855			7.25	.3937			10.	.8125	13/16	
.2874			7.3	.3970		X		.8268		21.
.2900		L		.4040		Y		.8281	53/64	
.2913			7.4	.4062	13/32			.8437	27/32	
.2950		M		.4130		Z		.8465		21.5
.2953			7.5	.4134			10.5	.8594	55/64	
.2968	19/64			.4219	27/64			.8661		22.
.2992			7.6	.4330			11.	.8750	7/8	
.3020		N		.4375	7/16			.8858		22.5
.3031			7.7	.4528			11.5	.8906	57/64	
.3051			7.75	.4531	29/64			.9055		23.
.3071			7.8	.4687	15/32			.9062	29/32	
.3110			7.9	.4724			12.	.9219	59/64	
.3125	5/16			.4843	31/64			.9252		23.5
.3150			8.	.4921			12.5	.9375	15/16	
.3160		O		.5000	1/2			.9449		24.
.3189			8.1	.5118			13.	.9531	61/64	
.3228			8.2	.5156	33/64			.9646		24.5
.3230		P		.5312	17/32			.9687	31/32	
.3248			8.25	.5315			13.5	.9843		25.
.3268			8.3	.5469	35/64			.9844	63/64	
.3281	21/64			.5512			14.	1.0000	1	
.3307			8.4							

Decimal Equivalents of Regular Sizes

Decimal	Inch	㎜	Decimal	Inch	㎜	Decimal	Inch	㎜
1.0040		25.5	1.4370		36.5	1.8594	1 55/64	
1.0156	1 1/64		1.4375	1 7/16		1.8701		47.5
1.0236		26.	1.4531	1 29/64		1.8750	1 7/8	
1.0312	1 1/32		1.4567		37.	1.8898		48.
1.0433		26.5	1.4687	1 15/32		1.8906	1 57/64	
1.0469	1 3/64		1.4764		37.5	1.9062	1 29/32	
1.0625	1 1/16		1.4844	1 31/64		1.9095		48.5
1.0630		27.	1.4961		38.	1.9219	1 59/64	
1.0781	1 5/64		1.5000	1 1/2		1.9291		49.
1.0827		27.5	1.5156	1 33/64		1.9375	1 15/16	
1.0937	1 3/32		1.5158		38.5	1.9488		49.5
1.1024		28.	1.5312	1 17/32		1.9531	1 61/64	
1.1094	1 7/64		1.5354		39.	1.9685		50.
1.1220		28.5	1.5469	1 35/64		1.9687	1 31/32	
1.1250	1 1/8		1.5551		39.5	1.9844	1 63/64	
1.1406	1 9/64		1.5625	1 9/16		1.9882		50.5
1.1417		29.	1.5748		40.	2.0000	2	
1.1562	1 5/32		1.5781	1 37/64		2.0079		51.
1.1614		29.5	1.5937	1 19/32		2.0156	2 1/64	
1.1719	1 11/64		1.5945		40.5	2.0276		51.5
1.1811		30.	1.6094	1 39/64		2.0312	2 1/32	
1.1875	1 3/16		1.6142		41.	2.0469	2 3/64	
1.2008		30.5	1.6250	1 5/8		2.0473		52.
1.2031	1 13/64		1.6339		41.5	2.0625	2 1/16	
1.2187	1 7/32		1.6406	1 41/64		2.0669		52.5
1.2205		31.	1.6536		42.	2.0781	2 5/64	
1.2344	1 15/64		1.6562	1 21/32		2.0867		53.
1.2402		31.5	1.6719	1 43/64		2.0937	2 3/32	
1.2500	1 1/4		1.6732		42.5	2.1063		53.5
1.2599		32.	1.6875	1 11/16		2.1094	2 7/64	
1.2656	1 17/64		1.6929		43.	2.1250	2 1/8	
1.2795		32.5	1.7031	1 45/64		2.1260		54.
1.2812	1 9/32		1.7126		43.5	2.1406	2 9/64	
1.2969	1 19/64		1.7187	1 23/32		2.1457		54.5
1.2992		33.	1.7323		44.	2.1562	2 5/32	
1.3125	1 5/16		1.7344	1 47/64		2.1654		55.
1.3189		33.5	1.7500	1 3/4		2.1719	2 11/64	
1.3281	1 21/64		1.7520		44.5	2.1850		55.5
1.3386		34.	1.7656	1 49/64		2.1875	2 3/16	
1.3437	1 11/32		1.7717		45.	2.2031	2 13/64	
1.3583		34.5	1.7812	1 25/32		2.2047		56.
1.3594	1 23/64		1.7914		45.5	2.2187	2 7/32	
1.3750	1 3/8		1.7969	1 51/64		2.2244		56.5
1.3780		35.	1.8110		46.	2.2344	2 15/64	
1.3906	1 25/64		1.8125	1 13/16		2.2441		57.
1.3977		35.5	1.8281	1 53/64		2.2500	2 1/4	
1.4062	1 13/32		1.8307		46.5	2.2638		57.5
1.4173		36.	1.8437	1 27/32		2.2656	2 17/64	
1.4219	1 27/64		1.8504		47.	2.2812	2 9/32	

Decimal Equivalents of Regular Sizes

Decimal	Inch	No.	Decimal	Inch	No.	Decimal	Inch
2.2835		58.	2.7165		69.	3.2500	3 1/4
2.2969	2 19/64		2.7187	2 23/32		3.2656	3 17/64
2.3031		58.5	2.7344	2 47/64		3.2812	3 9/32
2.3125	2 5/16		2.7362		69.5	3.2969	3 19/64
2.3228		59.	2.7500	2 3/4		3.3125	3 5/16
2.3281	2 21/64		2.7559		70.	3.3281	3 21/64
2.3425		59.5	2.7656	2 49/64		3.3437	3 11/32
2.3437	2 11/32		2.7756		70.5	3.3594	3 23/64
2.3594	2 23/64		2.7812	2 25/32		3.3750	3 3/8
2.3622		60.	2.7953		71.	3.3906	3 25/64
2.3750	2 3/8		2.7969	2 51/64		3.4062	3 13/32
2.3819		60.5	2.8125	2 13/16		3.4219	3 27/64
2.3906	2 25/64		2.8150		71.5	3.4375	3 7/16
2.4016		61.	2.8281	2 53/64		3.4531	3 29/64
2.4062	2 13/32		2.8346		72.	3.4687	3 15/32
2.4213		61.5	2.8437	2 27/32		3.4844	3 31/64
2.4219	2 27/64		2.8543		72.5	3.5000	3 1/2
2.4375	2 7/16		2.8594	2 55/64		3.5156	3 33/64
2.4409		62.	2.8740		73.	3.5312	3 17/32
2.4531	2 29/64		2.8750	2 7/8		3.5469	3 35/64
2.4606		62.5	2.8906	2 57/64		3.5625	3 9/16
2.4687	2 15/32		2.8937		73.5	3.5781	3 37/64
2.4803		63.	2.9062	2 29/32		3.5937	3 19/32
2.4844	2 31/64		2.9134		74.	3.6093	3 39/64
2.5000	2 1/2	63.5	2.9219	2 59/64		3.6250	3 5/8
2.5156	2 33/64		2.9331		74.5	3.6406	3 41/64
2.5197		64.	2.9375	2 15/16		3.6562	3 21/32
2.5312	2 17/32		2.9527		75.	3.6719	3 43/64
2.5394		64.5	2.9531	2 61/64		3.6875	3 11/16
2.5469	2 35/64		2.9687	2 31/32		3.7031	3 45/64
2.5590		65.	2.9724		75.5	3.7187	3 23/32
2.5625	2 9/16		2.9844	2 63/64		3.7344	3 47/64
2.5781	2 37/64		2.9921		76.	3.7500	3 3/4
2.5787		65.5	3.0000	3		3.7656	3 49/64
2.5937	2 19/32		3.0156	3 1/64		3.7812	3 25/32
2.5984		66.	3.0312	3 1/32		3.7969	3 51/64
2.6093	2 39/64		3.0469	3 3/64		3.8125	3 13/16
2.6181		66.5	3.0625	3 1/16		3.8281	3 53/64
2.6250	2 5/8		3.0781	3 5/64		3.8437	3 27/32
2.6378		67.	3.0937	3 3/32		3.8594	3 55/64
2.6406	2 41/64		3.1094	3 7/64		3.8750	3 7/8
2.6562	2 21/32		3.1250	3 1/8		3.8906	3 57/64
2.6575		67.5	3.1406	3 9/64		3.9062	3 29/32
2.6719	2 43/64		3.1562	3 5/32		3.9219	3 59/64
2.6772		68.	3.1719	3 11/64		3.9375	3 15/16
2.6875	2 11/16		3.1875	3 3/16		3.9531	3 61/64
2.6968		68.5	3.2031	3 13/64		3.9687	3 31/32
2.7031	2 45/64		3.2187	3 7/32		3.9844	3 63/64
			3.2344	3 15/64		4.0000	4

Values of Fractional Sizes Expressed in Millimeters

Fractional Sizes		1 Inch	2 Inch	3 Inch	4 Inch	5 Inch	6 Inch
		25.4	50.8	76.2	101.6	127.	152.4
1/64	0.40	25.80	51.20	76.60	102	127.39	152.79
1/32	0.79	26.19	51.59	76.99	102.39	127.79	153.19
3/64	1.19	26.59	51.99	77.39	102.79	128.19	153.59
1/16	1.59	26.99	52.39	77.79	103.19	128.59	153.98
3/64	1.98	27.38	52.78	78.18	103.58	128.98	154.38
5/32	2.38	27.78	53.18	78.58	103.98	129.38	154.78
7/64	2.77	28.17	53.58	78.98	104.37	129.78	155.18
1/8	3.17	28.57	53.97	79.37	104.77	130.17	155.57
9/64	3.57	28.97	54.37	79.77	105.17	130.57	155.97
5/32	3.97	29.37	54.77	80.17	105.57	130.97	156.37
11/64	4.37	29.76	55.16	80.56	105.96	131.36	156.76
3/16	4.76	30.16	55.56	80.96	106.36	131.76	157.16
13/64	5.16	30.56	55.96	81.36	106.76	132.16	157.56
7/32	5.56	30.96	56.36	81.75	107.16	132.55	157.95
15/64	5.95	31.35	56.75	82.15	107.55	132.95	158.35
1/4	6.35	31.75	57.15	82.55	107.95	133.35	158.75
17/64	6.75	32.15	57.55	82.95	108.34	133.74	159.14
9/32	7.14	32.54	57.94	83.34	108.74	134.14	159.54
19/64	7.54	32.94	58.34	83.74	109.14	134.54	159.94
5/16	7.94	33.34	58.74	84.14	109.54	134.94	160.33
21/64	8.33	33.73	59.13	84.53	109.93	135.33	160.73
11/32	8.73	34.13	59.53	84.93	110.33	135.73	161.13
23/64	9.13	34.53	59.93	85.33	110.73	136.13	161.53
3/8	9.52	34.92	60.32	85.72	111.12	136.52	161.92
25/64	9.92	35.32	60.72	86.12	111.52	136.92	162.32
13/32	10.32	35.72	61.12	86.52	111.92	137.32	162.72
27/64	10.72	36.11	61.51	86.91	112.31	137.71	163.11
7/16	11.11	36.51	61.91	87.31	112.71	138.11	163.51
29/64	11.51	36.91	62.31	87.71	113.11	138.51	163.91
15/32	11.91	37.31	62.71	88.1	113.5	138.9	164.3
31/64	12.3	37.7	63.1	88.5	113.9	139.3	164.7
1/2	12.7	38.1	63.5	88.9	114.3	139.7	165.1

Continued on next page

Values of Fractional Sizes Expressed in Millimeters

(Continued)

Fractional Sizes		1 Inch	2 Inch	3 Inch	4 Inch	5 Inch	6 Inch
33/64	13.10	38.49	63.90	89.3	114.69	140.09	165.49
17/32	13.49	38.89	64.29	89.69	115.09	140.49	165.89
35/64	13.89	39.29	64.69	90.09	115.49	140.89	166.29
9/16	14.29	39.69	65.09	90.49	115.89	141.29	166.68
37/64	14.68	40.08	65.48	90.88	116.28	141.68	167.08
19/32	15.08	40.48	65.88	91.28	116.68	142.08	167.48
39/64	15.48	40.88	66.28	91.68	117.08	142.48	167.88
5/8	15.87	41.27	66.67	92.07	117.47	142.87	168.27
41/64	16.27	41.67	67.07	92.47	117.87	143.27	168.67
21/32	16.67	42.07	67.47	92.87	118.27	143.67	169.07
43/64	17.07	42.46	67.86	93.26	118.66	144.06	169.46
11/16	17.46	42.86	68.26	93.66	119.06	144.46	169.86
45/64	17.86	43.26	68.66	94.06	119.46	144.86	170.26
23/32	18.26	43.66	69.05	94.45	119.85	145.25	170.65
47/64	18.65	44.05	69.45	94.85	120.25	145.65	171.05
3/4	19.05	44.45	69.85	95.25	120.65	146.05	171.45
49/64	19.45	44.85	70.25	95.65	121.04	146.44	171.84
25/32	19.84	45.24	70.64	96.04	121.44	146.84	172.24
51/64	20.24	45.64	71.04	96.44	121.84	147.24	172.64
13/16	20.64	46.04	71.44	96.84	122.24	147.63	173.03
53/64	21.03	46.43	71.83	97.23	122.63	148.03	173.43
27/32	21.43	46.83	72.23	97.63	123.03	148.43	173.83
55/64	21.83	47.23	72.63	98.03	123.43	148.83	174.22
7/8	22.22	47.62	73.02	98.42	123.82	149.22	174.62
57/64	22.62	48.02	73.42	98.82	124.22	149.62	175.02
29/32	23.02	48.42	73.82	99.22	124.62	150.02	175.42
59/64	23.42	48.81	74.21	99.61	125.01	150.41	175.81
15/16	23.81	49.21	74.61	100.01	125.41	150.81	176.21
61/64	24.21	49.61	75.01	100.41	125.81	151.21	176.61
31/32	24.61	50.01	75.4	100.8	126.2	151.6	177.
63/64	25.	50.4	75.8	101.2	126.6	152.	177.4

1 Millimeter = .03937 inch.

CODE

Private Code

THE USE of our Private Code in the dispatch of urgent business is recommended whenever applicable. We also have Lieber's, A. B. C., and Western Union Codes, which in some instances may be better adapted for our foreign friends.

Our Cable Address is "COX, Cleveland." To avoid confusion in using the Private Code please follow the form suggested below for orders:

Example:—Ship by express ten dozen $\frac{3}{16}$-inch Straight Shank Drills, list number 108.

Code Words:—Asoak, Battable, Absorb, Labium.

General Instructions

Code	
Asarum	Duplicate order.....
Asbestic	Cancel order.....
Asboline	Hold order.....until further advised
Ascend	Add to our order.....
Ascendant	Sample will be sent for order.....
Ascension	Diameter asked for is.....
Ascians	Want straight shank tools on our order.....
Ascidia	Want taper shank tools on our order.....
Asclepiad	Want list No.....for our order.....
Ascribe	Cannot wait for special tools—send the nearest you have
Aseptic	Cannot send sketch or sample—make the best you can to instructions given
Ashamed	We accept your proposition. Consider this an order. Will confirm
Ashelf	Give us quantity wanted for.....
Ashfire	Give Diameter.....
Ashler	Must have sample or sketch for order.....
Ashtub	What style tools do you want? Refer to our catalog and give list numbers
Asiarch	Do you want straight or taper shank tools for order No.....?
Aside	Instructions too late, have shipped order.....
Asinego	Cannot cancel order unless you are willing to pay for work already done
Askance	Do not understand your telegraph order.....
Asker	Do not understand your order.....give more specific instructions
Asking	Do not understand your order.....compare it with our catalog and advise
Aslant	Send sample at once
Asleep	Tools ordered are special and not carried in stock
Asoak	Ship by express
Asp	Ship by freight
Asparagus	Ship by first steamer
Aspartic	Ship all you can by express, balance as soon as possible
Aspect	Ship all you can by freight, balance as soon as possible
Asperity	Ship all you can by express, balance by freight
Aspermous	Ship all you can by freight, balance by express
Asphalt	Ship.....by express, balance freight
Asphyxia	Ship our order via.....Railway
Aspirant	Do not ship order.....until further advised
Aspire	Hold order for shipping instructions

General Instructions

(Continued)

Code	
Asquint	Trace shipment of our order.....
Assail	When will you ship our order.....?
Assailant	Ship order complete
Assassin	Can you ship at once?
Assault	Have you shipped our order?
Assay	Order complete—how shall we ship?
Assemble	Cannot ship order at once. Tools special. Will take until.....
Assent	Can ship order complete except special tools, will finish.....
Assertor	How do you want us to ship?
Assertory	We can ship at once upon receipt of order
Assessed	We can ship within 5 days from receipt of order
Assessing	We can ship in about 1 week from receipt of order
Assession	We can ship in about 2 weeks from receipt of order
Assessment	We can ship in about 3 weeks from receipt of order
Assessor	We can ship in about 4 weeks from receipt of order
Asset	We can ship in about 5 weeks from receipt of order
Asseverate	We can ship in about 6 weeks from receipt of order
Assidean	We can ship in about 7 weeks from receipt of order
Assidual	We can ship in about 8 to 10 weeks from receipt of order
Assiduity	We can ship in about 10 to 12 weeks from receipt of order
Assientist	We can ship in about 14 to 16 weeks from receipt of order
Assiento	We can ship in about 18 to 20 weeks from receipt of order
Assign	We can ship in about 20 to 25 weeks from receipt of order
Assignable	We can ship in about 6 to 8 months from receipt of order
Assigned	We can ship in about 8 to 10 months from receipt of order
Assignment	We can ship in about 10 to 12 months from receipt of order
Assignor	We will require more than a year to make shipment
Assimilate	In stock, subject to prior sale
Associate	We can ship.....
Assonant	Please reply to our letter of.....
Assuage	Please reply to our telegram of.....
Assume	Must have information asked for before we can go ahead
Assumpsit	We have written you on subject

General Instructions

(Continued)

Code	
Assured	Have you received our letter of.....?
Astacus	Have you received our telegram of.....?
Astarte	Wire best price and earliest delivery
Aster	Please confirm
Asterisk	Send invoice of shipment
Asthma	Send duplicate invoice of shipment
Astound	What discount will you make us on list No.....?
Astral	Prices quoted are net
Astralin	We can quote regular list less discount of.....
Astraught	We can quote regular list plus.....
Astray	Have not received order referred to
Astride	We have received your letter. Information satisfactory
Astrology	We have not received any word from you. Let us hear
Astronomer	Wire if not in stock
Astute	Parcel Post
Asunder	Parcel Post, insured

Prices

5%—Facade	5–5%—Fiber	5–10%—Foam
10%—Face	10–5%—Fibrinous	10–10%—Fobchain
15%—Faceache	15–5%—Fibroid	15–10%—Focusing
20%—Facedge	20–5%—Fibula	20–10%—Fogeater
25%—Faceharden	25–5%—Fickle	25–10%—Fogram
30%—Faceless	30–5%—Fiction	30–10%—Foil
33⅓%–Facestone	33⅓–5%–Fiddle	33⅓–10%–Folding
35%—Facetious	35–5%—Fiddlewood	35–10%—Foliate
40%—Facial	40–5%—Fidelity	40–10%—Folkland
45%—Facility	45–5%—Fidgety	45–10%—Following
50%—Facsimile	50–5%—Fiduciary	50–10%—Fondant
55%—Factional	55–5%—Fieldcress	55–10%—Fontanel
60%—Factor	60–5%—Fieldhand	60–10%—Foolhardy
65%—Factotum	65–5%—Fieldsman	65–10%—Footbridge
66⅔%–Facture	66⅔–5%–Fiendish	66⅔–10%–Footguard
70%—Faculty	70–5%—Figaro	70–10%—Footmark
75%—Faddist	75–5%—Figleaf	75–10%—Forage
80%—Fading	80–5%—Figurate	80–10%—Forbidden

Example

Information Wanted by us

What style tools do you want? Refer to our catalog and give list number. **Code Word:** Ashtub.

Reply to Above

Taper Shank Drills, list number 106. **Code Word:** Label.

Table of Dates

Taken from the Adams Cable Codex by permission of Messrs. F. O. Houghton & Co., Boston, Mass., New England Agents of the Red Star Line of Steamers. For example, "Armsberg" would mean first of January.

Date	Beginning for the day	Ending for the month	Month
First	Arms	Berg	January
Second	Aron	Boro	February
Third	Ash	Dorf	March
Fourth	Attle	Dale	April
Fifth	Baron	Field	May
Sixth	Beach	Ford	June
Seventh	Bloom	Ham	July
Eighth	Brown	Mont	August
Ninth	Barro	Shire	September
Tenth	Clark	Ton	October
Eleventh	Clay	Ville	November
Twelfth	Cake	Wood	December
Thirteenth	Cole		
Fourteenth	Dress		
Fifteenth	Devon		
Sixteenth	Dun		
Seventeenth	Eden		
Eighteenth	Elgin		
Nineteenth	Eton		
Twentieth	Fair		
Twenty-first	Glen		
Twenty-second	Green		
Twenty-third	Hazel		
Twenty-fourth	Lees		
Twenty-fifth	Lynn		
Twenty-sixth	Olden		
Twenty-seventh	Oster		
Twenty-eighth	Pitts		
Twenty-ninth	Plain		
Thirtieth	Raven		
Thirty-first	Rock		

Example

Information Wanted

Do not understand your order March third. Compare it with our catalog and advise. **Code Words:** Asking, Ashdorf.

Reply to Above

Want list number one hundred six for our order March third. **Code Words:** Asclepiad, Label.

Quantities

Code		Code		Code	
1	Baby	53	Banister	105	Bastinado
2	Babyish	54	Banjo	106	Basting
3	Babylon	55	Banner	107	Batavian
4	Bachelor	56	Bannock	108	Bateful
5	Backbite	57	Banquet	109	Bateless
6	Backbone	58	Bantam	110	Bath
7	Backdoor	59	Baptist	111	Bather
8	Backing	60	Barbara	112	Bathetic
9	Backside	61	Barbarism	113	Bathos
10	Backward	62	Barbarity	114	Bating
11	Baden	63	Barbecue	115	Batiste
12	Badge	64	Barber	116	Batlet
13	Badinage	65	Bard	117	Batman
14	Badly	66	Bardell	118	Batmoney
15	Badness	67	Bardish	119	Batshell
16	Baffle	68	Bardism	120	Battable
17	Bag	69	Barking	121	Battalion
18	Bagdad	70	Barkis	122	Batteller
19	Bagman	71	Barkless	123	Battledoor
20	Bagpipe	72	Barkpit	124	Battlement
21	Bagstock	73	Barmaid	125	Battling
22	Bailiff	74	Barn	126	Battology
23	Bain	75	Barnabas	127	Battue
24	Baker	76	Barnaby	128	Battuta
25	Bakery	77	Barnacle	129	Batz
26	Balcony	78	Baroness	130	Baubee
27	Bald	79	Barony	131	Baudekin
28	Baldhead	80	Barograph	132	Bauge
29	Baldness	81	Barouche	133	Bauhinia
30	Baldpate	82	Barrack	134	Bauk
31	Baldric	83	Barrister	135	Baulite
32	Baldwin	84	Barrow	136	Bavaroy
33	Balky	85	Barry	137	Bavin
34	Ball	86	Barton	138	Bawbling
35	Ballad	87	Bartram	139	Bawcock
36	Balloon	88	Baritone	140	Bawdrick
37	Balm	89	Basalt	141	Bawdry
38	Balmoral	90	Baseless	142	Bawn
39	Balmy	91	Basely	143	Bawrel
40	Balsam	92	Basement	144	Bawsin
41	Baluster	93	Bashaw	145	Baxter
42	Bamberg	94	Bashful	146	Bayadere
43	Bamboo	95	Basil	147	Bayardly
44	Bamoth	96	Basilisk	148	Bayberry
45	Banana	97	Bask	149	Baylaurel
46	Bandage	98	Basket	150	Baying
47	Bandbox	99	Bass	151	Bayleaf
48	Bandit	100	Bassett	152	Bayonet
49	Bandog	101	Bassinet	153	Bayou
50	Baneful	102	Bassoon	154	Baysalt
51	Banian	103	Bastard	155	Baytree
52	Banish	104	Bastile	156	Baywindow

Quantities
(Continued)

	Code		Code		Code
157	Bayyarn	209	Beaufin	261	Beverage
158	Bazat	210	Beaupeer	262	Bewail
159	Beach	211	Beauship	263	Bewilder
160	Beached	212	Beautiful	264	Beylick
161	Beaching	213	Beautify	265	Beyond
162	Beachy	214	Beaverrat	266	Bezoar
163	Beacon	215	Became	267	Biaxal
164	Beaconage	216	Becard	268	Bibacious
165	Beaconing	217	Bechance	269	Biblus
166	Beaconless	218	Bechic	270	Biceps
167	Beadlery	219	Becket	271	Bickern
168	Beadship	220	Beclip	272	Bicolor
169	Beadproof	221	Becoming	273	Bicuspis
170	Beadroll	222	Becurl	274	Bidden
171	Beads	223	Bedaff	275	Biform
172	Beadsman	224	Bedale	276	Bifurcate
173	Beadsnake	225	Bedared	277	Bigamy
174	Beadtool	226	Bedazzle	278	Bigaroon
175	Beadtree	227	Bedelry	279	Bigness
176	Beagle	228	Bedight	280	Bigotry
177	Beakiron	229	Bedim	281	Bijou
178	Beaks	230	Bedizen	282	Bijugate
179	Beals	231	Bedlamite	283	Bilander
180	Beam	232	Bedlinen	284	Bilberry
181	Beambird	233	Bedmate	285	Bilge
182	Beamed	234	Bedouins	286	Bilimbi
183	Beamful	235	Bedplate	287	Bilingual
184	Beaming	236	Bedpost	288	Bilious
185	Beamless	237	Bedquilt	289	Bilk
186	Beamy	238	Bedrench	290	Billfish
187	Beancaper	239	Bedrid	291	Billiards
188	Beancod	240	Bedrop	292	Billman
189	Beanfed	241	Bedside	293	Billow
190	Beanfly	242	Bengalese	294	Bilobed
191	Bearable	243	Benignly	295	Bime
192	Bearberry	244	Benjamin	296	Bimedial
193	Bearbind	245	Benkit	297	Bimensal
194	Bearded	246	Benumb	298	Binary
195	Bearfly	247	Benzoic	299	Binate
196	Bearherd	248	Benzoyl	300	Binding
197	Bearing	249	Berlash	301	Bindwood
198	Bearish	250	Bereft	302	Binnacle
199	Bearlike	251	Berlin	303	Binomial
200	Bearsear	252	Bertram	304	Binous
201	Bearskin	253	Beryl	305	Binoxide
202	Bearward	254	Besiege	306	Biology
203	Beastings	255	Bestial	307	Biotine
204	Beastler	256	Betake	308	Bipedal
205	Beat	257	Betony	309	Bipinnate
206	Beaten	258	Bethrothal	310	Biplicate
207	Beatific	259	Betuline	311	Bipolar
208	Beatitude	260	Betwixt	312	Bipont

Quantities

(Continued)

Code		Code		Code	
313	Birchen	365	Blemish	417	Bobcherry
314	Birdman	366	Blending	418	Bobolink
315	Bireme	367	Blenny	419	Bobstay
316	Birlaw	368	Bless	420	Bobtail
317	Birman	369	Bletting	421	Bocal
318	Birthday	370	Bleyme	422	Bocardo
319	Bisect	371	Blighted	423	Bocasine
320	Biserial	372	Blindage	424	Bocca
321	Bisetose	373	Blindfold	425	Bockelet
322	Bishop	374	Blindly	426	Bocking
323	Bismuthal	375	Blinking	427	Bockland
324	Bisogno	376	Blissful	428	Bodeful
325	Bissac	377	Blistering	429	Bodement
326	Bistoury	378	Blithely	430	Bodiless
327	Bistre	379	Bloater	431	Boding
328	Bisulcous	380	Block	432	Bodkin
329	Biter	381	Blockade	433	Bodleian
330	Bitingly	382	Blockish	434	Body
331	Bittern	383	Blomary	435	Boeotian
332	Bitterness	384	Blondlace	436	Bogbean
333	Bitumen	385	Bloody	437	Bogberry
334	Bivalved	386	Blossomy	438	Bogland
335	Biventral	387	Blotting	439	Bogore
336	Bivouac	388	Blowfly	440	Bogus
337	Bixa	389	Blowzy	441	Bohemian
338	Bixwort	390	Blubber	442	Boiled
339	Bizantine	391	Bludgeon	443	Boilery
340	Bizard	392	Bluebell	444	Boilingly
341	Blab	393	Blueness	445	Boldface
342	Blackbird	394	Bluepeter	446	Boldly
343	Blacking	395	Bluestone	447	Boldness
344	Blackly	396	Bluffness	448	Bolero
345	Blacktail	397	Bluffy	449	Boletus
346	Bladed	398	Bluish	450	Bollard
347	Blain	399	Blundering	451	Bollimony
348	Blamably	400	Blunker	452	Bollworm
349	Blameless	401	Bluntly	453	Bolognian
350	Blandish	402	Blurt	454	Bolstering
351	Blanket	403	Blushy	455	Bolthead
352	Blankly	404	Bluster	456	Bolting
353	Blare	405	Boa	457	Boltonite
354	Blarney	406	Boarder	458	Bolus
355	Blasting	407	Boast	459	Bomb
356	Blatant	408	Boastful	460	Bombardo
357	Blatter	409	Boaston	461	Bombast
358	Blauwbok	410	Boatable	462	Bombastic
359	Blaze	411	Boating	463	Bombazine
360	Blazing	412	Boatlike	464	Bombiate
361	Blazonry	413	Boatman	465	Bombyx
362	Bleaching	414	Boatswain	466	Bonafide
363	Bleakness	415	Bobbery	467	Bonacus
364	Bleed	416	Bobbinet	468	Bondman

Quantities

(Continued)

Code		Code		Code	
469	Boneset	521	Bosky	573	Boutsrimes
470	Bonetta	522	Bossage	574	Bovate
471	Bonfire	523	Bosset	575	Boveycoal
472	Boning	524	Bossy	576	Bovine
473	Bonito	525	Bosvel	577	Bowbearer
474	Bonnet	526	Boswellian	578	Bowbell
475	Bonniviss	527	Botanical	579	Bowbent
476	Bonus	528	Botanist	580	Bowboy
477	Bony	529	Botany	581	Bowcompass
478	Boobyish	530	Botargo	582	Bowdrill
479	Bookcase	531	Botchy	583	Bowelless
480	Bookery	532	Boteroll	584	Bowels
481	Bookful	533	Bother	585	Boweric
482	Bookish	534	Bothnian	586	Bowge
483	Booklet	535	Botline	587	Bowgrace
484	Bookman	536	Botrychium	588	Bowhand
485	Booksale	537	Botryoid	589	Bowieknife
486	Bookworm	538	Botryolite	590	Bowingly
487	Booly	539	Bottle	591	Bowknot
488	Boomerang	540	Bottleale	592	Bowl
489	Boom	541	Bottlebump	593	Bowalley
490	Boorish	542	Bottlefish	594	Bowlder
491	Boost	543	Bottling	595	Bowlegged
492	Bootcrimp	544	Bottomed	596	Bowless
493	Bootikin	545	Bottomland	597	Bowling
494	Bootless	546	Bottomless	598	Bowman
495	Booty	547	Bottomry	599	Bowoar
496	Bopeep	548	Bouchet	600	Bownet
497	Borable	549	Boudoir	601	Bowpen
498	Borachio	550	Bough	602	Bowpiece
499	Boracic	551	Boughten	603	Bowsaw
500	Boracite	552	Bougie	604	Bowshot
501	Boracous	553	Bouillon	605	Bowsprit
502	Boramez	554	Boulea	606	Bowstring
503	Borax	555	Boulevard	607	Bowwindow
504	Bordage	556	Boulten	608	Bowwow
505	Bordetti	557	Bouncing	609	Boxtree
506	Border	558	Bouncingly	610	Boxwood
507	Bordering	559	Bound	611	Boyblind
508	Bordlode	560	Boundary	612	Boyhood
509	Bordman	561	Bounder	613	Boyishly
510	Bordure	562	Boundless	614	Boyishness
511	Boreas	563	Bounteous	615	Boyism
512	Borecole	564	Bountiful	616	Boyn
513	Boring	565	Bounty	617	Boyship
514	Bornite	566	Bouquet	618	Boysplay
515	Boron	567	Bourgeois	619	Brabantine
516	Borough	568	Bourn	620	Brabbling
517	Borrelist	569	Bournless	621	Braccate
518	Borsella	570	Bournonite	622	Bracelet
519	Borsholder	571	Bourse	623	Bracer
520	Boshbok	572	Boutade	624	Brachiate

Quantities

(Continued)

Code		Code		Code	
625	Brachylogy	677	Bravo	729	Brevetcy
626	Bracing	678	Bravura	730	Breviside
627	Bracken	679	Brawl	731	Breviped
628	Bracketing	680	Brawling	732	Brevity
629	Brackish	681	Brawner	733	Brew
630	Bracteal	682	Brawniness	734	Brewage
631	Bradypod	683	Brawny	735	Brewing
632	Braggart	684	Braws	736	Brewis
633	Bragging	685	Braxy	737	Brewster
634	Brahmin	686	Braying	738	Breziline
635	Brailup	687	Brayle	739	Bribe
636	Brained	688	Brazed	740	Bribeless
637	Brainish	689	Brazenly	741	Bribery
638	Brainless	690	Brazenness	742	Brickbat
639	Brainsick	691	Brazier	743	Brickclay
640	Braird	692	Brazil	744	Brickdust
641	Brait	693	Braziletto	745	Brickfield
642	Brakeman	694	Brazillian	746	Brickkiln
643	Braky	695	Brazilnut	747	Bricklayer
644	Brambly	696	Braziltea	748	Brickmaker
645	Braminical	697	Brazilwood	749	Brickwork
646	Brancard	698	Brazing	750	Bridal
647	Branch	699	Breachy	751	Bridecake
648	Branchery	700	Breadcorn	752	Bridegroom
649	Branching	701	Breadnut	753	Bridesman
650	Branchlet	702	Breadth	754	Bridewell
651	Brander	703	Breakable	755	Bridgy
652	Brandgoose	704	Breakage	756	Bridleport
653	Branding	705	Breaker	757	Bridler
654	Brandiron	706	Breaking	758	Bridson
655	Brandisher	707	Breakneck	759	Briefless
656	Brandrith	708	Bream	760	Briefly
657	Brandy	709	Breaming	761	Briefman
658	Brangler	710	Breast	762	Briery
659	Brangling	711	Breastbone	763	Brig
660	Branks	712	Breastfast	764	Brigade
661	Branlin	713	Breastbook	765	Brigadier
662	Brannew	714	Breastpin	766	Brigandage
663	Brantfox	715	Breastwork	767	Brigantine
664	Branular	716	Breathe	768	Brighten
665	Brash	717	Breathing	769	Brighteyed
666	Brassage	718	Breccia	770	Brightly
667	Brassart	719	Breech	771	Brightness
668	Brassica	720	Breeching	772	Brigue
669	Brassy	721	Breeder	773	Brilliancy
670	Brat	722	Breeding	774	Brilliant
671	Braunite	723	Breezeless	775	Brills
672	Bravado	724	Breezy	776	Brim
673	Bravely	725	Brehon	777	Brimful
674	Braveness	726	Brethren	778	Brimless
675	Bravery	727	Brettice	779	Brimming
676	Bravingly	728	Brevet	780	Brimsmade

Quantities
(Continued)

Code		Code		Code	
781	Brimstony	833	Bronchial	885	Brunion
782	Brindle	834	Bronchitis	886	Brunt
783	Brindepit	835	Bronchus	887	Brushiness
784	Bringer	836	Brontern	888	Brushing
785	Bringerup	837	Brontolite	889	Brushlike
786	Briny	838	Brontology	890	Brushmaker
787	Brisk	839	Bronze	891	Brushwood
788	Brisket	840	Bronzite	892	Brushy
789	Briskness	841	Brooch	893	Brusk
790	Bristled	842	Broods	894	Brutal
791	Bristly	843	Brooding	895	Brutalize
792	Brisure	844	Broodmare	896	Brutally
793	Britannic	845	Brooklet	897	Brute
794	British	846	Brookline	898	Bruteness
795	Britishgum	847	Brookmint	899	Brutify
796	Briton	848	Brookweed	900	Brutishly
797	Brittle	849	Brooky	901	Brutus
798	Brittleness	850	Broom	902	Bryony
799	Britzska	851	Broomcorn	903	Bryazoan
800	Brize	852	Broomland	904	Bubbler
801	Broacher	853	Broomrape	905	Bubbly
802	Broadaxe	854	Broomstaff	906	Buboninae
803	Broadbill	855	Broomstick	907	Bubons
804	Broadcast	856	Broomy	908	Buccal
805	Broadcloth	857	Brosimum	909	Buccaneer
806	Broaden	858	Broth	910	Buccinal
807	Broadfoot	859	Brotherly	911	Buccinite
808	Broadish	860	Brougham	912	Bucco
809	Broadly	861	Brow	913	Buccula
810	Broadness	862	Browbeat	914	Buccutaur
811	Broadseal	863	Browbound	915	Buceros
812	Broadside	864	Browless	916	Bucholzite
813	Broadwise	865	Brownbill	917	Bucka
814	Brocade	866	Browncoal	918	Buckbasket
815	Brocatello	867	Browngull	919	Buckbean
816	Broccoli	868	Browning	920	Bucket
817	Brochette	869	Brownism	921	Bucketful
818	Brochure	870	Brownrust	922	Buckety
819	Brocket	871	Brownspar	923	Buckeyed
820	Brodekin	872	Brownstudy	924	Bucking
821	Broggle	873	Browpost	925	Buckish
822	Brogue	874	Browse	926	Buckler
823	Broidery	875	Browsing	927	Buckmast
824	Broil	876	Bruchus	928	Buckram
825	Broiler	877	Brucite	929	Buckskin
826	Brokenly	878	Bruin	930	Buckstall
827	Brokenness	879	Bruiser	931	Buckthorn
828	Brokerage	880	Bruiswort	932	Buckwheat
829	Brokery	881	Bruising	933	Bucolic
830	Bromal	882	Brulyement	934	Bucranes
831	Bromegrass	883	Brumalia	935	Bucraniom
832	Bromine	884	Brunette	936	Bud

Quantities

(Continued)

Code		Code		Code	
937	Buddha	989	Bullcomber	3050	Buoyage
938	Buddhist	990	Bulldog	3100	Buoyant
939	Budding	991	Bulletin	3150	Buoyantly
940	Buddle	992	Bulletwood	3200	Buoyrope
941	Budelight	993	Bullfaced	3250	Buphaga
942	Budgero	994	Bullfight	3300	Burac
943	Budgy	995	Bullfinch	3350	Burbot
944	Budlet	996	Bullflee	3400	Burdelais
945	Buffalo	997	Bullfly	3450	Burdener
946	Buffcoats	998	Bullfrog	3500	Burdensome
947	Buffer	999	Bullhead	3550	Burdock
948	Bufferhead	1000	Bullimony	3600	Burdon
949	Buffets	1050	Bullionist	3650	Bureau
950	Buffeting	1100	Bullirag	3700	Bureaucra
951	Buffjerkin	1150	Bullish	3750	Burette
952	Buffle	1200	Bullock	3800	Burgall
953	Buffoon	1250	Bullseye	3850	Burgess
954	Buffoonery	1300	Bullstag	3900	Burghal
955	Buffoonish	1350	Bulltrout	3950	Burghbote
956	Buffstick	1400	Bullwort	4000	Burghist
957	Buffycoat	1450	Bully	4050	Burgholder
958	Buffymite	1500	Bullying	4100	Burglarist
959	Bugaboo	1550	Bulrush	4150	Burglary
960	Bugbear	1600	Bulse	4200	Burgmaster
961	Buggy	1650	Bulwark	4250	Burgmot
962	Bugle	1700	Bumbailiff	4300	Burgoo
963	Buglehorn	1750	Bumble	4350	Burgrave
964	Bugleweed	1800	Bumblebee	4400	Burgundy
965	Bugloss	1850	Bumboat	4450	Burgward
966	Bugwort	1900	Bumelia	4500	Burial
967	Buhlwork	1950	Bump	4550	Burin
968	Buhrstone	2000	Bumper	4600	Burker
969	Builder	2050	Bumpkinly	4650	Burkism
970	Building	2100	Bumptious	4700	Burlace
971	Built	2150	Bunchiness	4750	Burlap
972	Bukschish	2200	Bunchy	4800	Burlesque
973	Bulamfever	2250	Buncomb	4850	Burlet
974	Bulbaceous	2300	Bunkum	4900	Burletta
975	Bulbed	2350	Bundles	4950	Burliness
976	Bulbina	2400	Bungalow	5000	Burly
977	Bulbul	2450	Bunghole	5050	Burnable
978	Bulge	2500	Bungler	5100	Burnetrose
979	Bulimy	2550	Bungling	5150	Burning
980	Bulk	2600	Bungo	5200	Burnisher
981	Bulkhead	2650	Bunker	5250	Burnishing
982	Bulkiness	2700	Bunnies	5300	Burnt
983	Bulky	2750	Bunny	5350	Burr
984	Bulla	2800	Bunsing	5400	Burrage
985	Bullantic	2850	Bunter	5450	Burrel
986	Bullate	2900	Bunting	5500	Burrelfly
987	Bullbeef	2950	Buntline	5550	Burrock
988	Bullcalf	3000	Bunyan	5600	Burrow

Quantities

(Continued)

Code		Code		Code	
5650	Burrowing	6850	Busybody	8000	Buzzard
5700	Burrpod	6900	Butchery	8050	Buzzing
5750	Bursary	6950	Butend	8100	Byblow
5800	Burse	7000	Butleress	8150	Bycorner
5850	Burton	7050	Butment	8200	Byend
5900	Burtonale	7100	Butshaft	8250	Bygone
5950	Burying	7150	Butt	8300	Bylander
6000	Bushbok	7200	Buttercup	8350	Bylaw
6050	Busheller	7250	Butterfly	8400	Byname
6100	Bushet	7300	Buttermilk	8450	Bypath
6150	Bushing	7350	Buttery	8500	Byplot
6200	Bushman	7400	Butthinge	8550	Byre
6250	Bushmetal	7450	Butting	8600	Byroad
6300	Bushquail	7500	Buttock	8650	Byroom
6350	Busily	7550	Button	8700	Byspell
6400	Business	7600	Buttonhole	8750	Byssine
6450	Busk	7650	Buttress	8800	Byssus
6500	Busket	7700	Butwink	8850	Bystreet
6550	Buskin	7750	Butyrine	8900	Byview
6600	Buskman	7800	Buxom	8950	Bywalk
6650	Bustamite	7850	Buxomly	9900	Byway
6700	Bustle	7900	Buyer	9950	Bywipe
6750	Busts	7950	Buzz	10000	Byword
6800	Busy				

Example

Ship by express ten dozen three-sixteenths inch Straight Shank Drills, list number one hundred eight. **Code Words: Asoak,** Battable, Absorb, Labium.

When Ordering Always Use This Form

Code—Fractional Sizes

Size	Code
1/64	Abram
1/32	Abreast
3/64	Abridge
1/16	Abroach
5/64	Abrupt
3/32	Absalom
7/64	Absentee
1/8	Absolute
9/64	Absolution
5/32	Absolve
11/64	Absonant
3/16	Absorb
13/64	Absorbent
7/32	Abstain
15/64	Abstina
1/4	Abstraction
17/64	Abstruse
9/32	Absurd
19/64	Abubeker
5/16	Abugero
21/64	Abukir
11/32	Abuse
23/64	Abusive
3/8	Abut
25/64	Abutment
13/32	Abyss
27/64	Academy
7/16	Acadia
29/64	Accent
15/32	Accord
31/64	Accordant
1/2	Accost
33/64	Accurse
17/32	Accustom
35/64	Ache
9/16	Aching
37/64	Acorn
19/32	Acoustics
39/64	Acquaint
5/8	Acquire
41/64	Acquisition
21/32	Acquit
43/64	Actress
11/16	Actuary
45/64	Actuate
23/32	Acumen
47/64	Acute
3/4	Ada
49/64	Adage
25/32	Adair
51/64	Adam
13/16	Adapt
53/64	Adder
27/32	Addict
55/64	Addison
7/8	Addition
57/64	Addle
29/32	Address
59/64	Adena
15/16	Adequate
61/64	Adhere
31/32	Adhesion
63/64	Adieu
1	Adjacent
1 1/64	Adjoin
1 1/32	Adjudge
1 3/64	Adjutant
1 1/16	Administer
1 5/64	Admirable
1 3/32	Admiral
1 7/64	Admiration
1 1/8	Admire
1 9/64	Adobe
1 5/32	Adolph
1 11/64	Adolphus
1 3/16	Adoniram
1 13/64	Adorn
1 7/32	Adria
1 15/64	Adriana
1 1/4	Adrift
1 17/64	Adult
1 9/32	Adultery
1 19/64	Advent
1 5/16	Adverb
1 21/64	Adverse
1 11/32	Afar
1 23/64	Affable
1 3/8	Affair
1 25/64	Affector
1 13/32	Affiant
1 27/64	Affiliate
1 7/16	Affinity
1 29/64	Affirm
1 15/32	Affix
1 31/64	Afflict
1 1/2	Affluent
1 33/64	Afflux
1 17/32	Afford
1 35/64	Affray
1 9/16	Affright
1 37/64	Affront
1 19/32	Affusion
1 39/64	Affy
1 5/8	Afraid
1 41/64	Afresh
1 21/32	African
1 43/64	Agate
1 11/16	Agatha
1 45/64	Ageable
1 23/32	Aged
1 47/64	Agedly
1 3/4	Ageless
1 49/64	Aghast
1 25/32	Agile
1 51/64	Agility
1 13/16	Agincour
1 53/64	Agist
1 27/32	Agitate
1 55/64	Aglow
1 7/8	Agnes
1 57/64	Agog
1 29/32	Agonist
1 59/64	Agony
1 15/16	Agrippa
1 61/64	Ague
1 31/32	Aguish
1 63/64	Ahishar
2	Ahoy
2 1/64	Ailment
2 1/32	Aim
2 3/64	Aimless
2 1/16	Airgun
2 5/64	Airhole
2 3/32	Airpump
2 7/64	Airship
2 1/8	Airy
2 9/64	Aix
2 5/32	Ajar
2 11/64	Ajuga
2 3/16	Akerman
2 13/64	Akin
2 7/32	Alabaster
2 15/64	Aladdin
2 1/4	Alameda
2 17/64	Alamo
2 9/32	Alarum
2 19/64	Alas
2 5/16	Alba
2 21/64	Albatross
2 11/32	Albemarle
2 23/64	Albert
2 3/8	Albinism
2 25/64	Albino
2 13/32	Albumen
2 27/64	Alcalde
2 7/16	Alcohol
2 29/64	Alcove
2 15/32	Alderman
2 31/64	Aldine
2 1/2	Aldrich
2 33/64	Alehouse
2 17/32	Aleppo

Code—Fractional Sizes

(Continued)

Size	Code	Size	Code	Size	Code
2 35/64	Alert	3 3/4	Amherst	5 13/32	Angustate
2 9/16	Alexander	3 25/32	Amien	5 7/16	Anile
2 37/64	Alexis	3 13/16	Amiss	5 15/32	Aniline
2 19/32	Alfonso	3 27/32	Amma	5 1/2	Animal
2 39/64	Alfred	3 7/8	Ammonite	5 17/32	Animate
2 5/8	Alga	3 29/32	Amorist	5 9/16	Animist
2 41/64	Algebra	3 15/16	Amorphos	5 19/32	Animous
2 21/32	Algeria	3 31/32	Amoskeag	5 5/8	Anisic
2 43/64	Algerine	4	Ample	5 21/32	Ankered
2 11/16	Algiers	4 1/32	Amplify	5 11/16	Ankler
2 45/64	Alhama	4 1/16	Amputate	5 23/32	Annalize
2 23/32	Alhambra	4 3/32	Amuck	5 3/4	Anneloid
2 47/64	Alibi	4 1/8	Amulet	5 25/32	Annex
2 3/4	Alice	4 5/32	Amuse	5 13/16	Annotate
2 49/64	Alien	4 3/16	Anabasis	5 27/32	Anode
2 25/32	Alight	4 7/32	Anaccnda	5 7/8	Anodyne
2 51/64	Alimony	4 1/4	Anadem	5 29/32	Anopla
2 13/16	Alkali	4 9/32	Anaglyph	5 15/16	Anseres
2 53/64	Allah	4 5/16	Anagram	5 31/32	Antacid
2 27/32	Allegation	4 11/32	Anagraph	6	Antagonist
2 55/64	Allege	4 3/8	Analogist	6 1/32	Antagrit
2 7/8	Allegheny	4 13/32	Analogy	6 1/16	Antagure
2 57/64	Allegro	4 7/16	Anapest	6 3/32	Antake
2 29/32	Allen	4 15/32	Anaphora	6 1/8	Antalgic
2 59/64	Alleviate	4 1/2	Anarchy	6 5/32	Antaliate
2 15/16	Alliance	4 17/32	Anathema	6 3/16	Antalmic
2 61/64	Allot	4 9/16	Anatomist	6 7/32	Antalode
2 31/32	Alloyed	4 19/32	Anatomy	6 1/4	Antamale
2 63/64	Allude	4 5/8	Ancestor	6 9/32	Antapic
3	Allure	4 21/32	Ancient	6 5/16	Antaque
3 1/32	Almaden	4 11/16	Ancona	6 11/32	Antarctic
3 1/16	Almon	4 23/32	Andaman	6 3/8	Antarthid
3 3/32	Almorah	4 3/4	Andover	6 13/32	Antbear
3 1/8	Aloe	4 25/32	Andrew	6 7/16	Antbox
3 5/32	Aloof	4 13/16	Aneurism	6 15/32	Anteater
3 3/16	Alp	4 27/32	Angelica	6 1/2	Antecedent
3 7/32	Alpen	4 7/8	Angelo	6 17/32	Antedate
3 1/4	Alphabet	4 29/32	Angelus	6 9/16	Antelope
3 9/32	Alsace	4 15/16	Anger	6 19/32	Antelman
3 5/16	Altenburg	4 31/32	Angle	6 5/8	Antennae
3 11/32	Alto	5	Anglican	6 21/32	Antenox
3 3/8	Altorf	5 1/32	Anglice	6 11/16	Antepast
3 13/32	Aluminum	5 1/16	Anglify	6 23/32	Antepenult
3 7/16	Amadeus	5 3/32	Anglo	6 3/4	Anterior
3 15/32	Amalekite	5 1/8	Angola	6 25/32	Anteroom
3 1/2	Amalgam	5 5/32	Angor	6 13/16	Anthem
3 17/32	Amass	5 3/16	Angostura	6 27/32	Anthology
3 9/16	Amatory	5 7/32	Angrily	6 7/8	Anthony
3 19/32	Amazon	5 1/4	Anguish	6 29/32	Anthracite
3 5/8	Amberger	5 9/32	Angular	6 15/16	Anthropoid
3 21/32	Ambush	5 5/16	Angulatior	6 31/32	Antic
3 11/16	Amen	5 11/32	Angulose	7	Anticipate
3 23/32	American	5 3/8	Angust		

Code—Millimeter Sizes

Size	Code	Size	Code	Size	Code
.5	Abranchia	5.7	Absterge	14.5	Acmite
.6	Abratery	5.8	Absterse	15.	Acouchy
.7	Abrave	5.9	Abstersion	15.5	Acquiesce
.8	Abraxito	6.	Abstinent	16.	Acquiring
.9	Abregest	6.1	Abstirbo	16.5	Acquisitor
1.	Abreption	6.2	Abstorted	17.	Acrostic
1.1	Abrevey	6.3	Abstracted	17.5	Actuaryte
1.2	Abridged	6.4	Abstractly	18.	Aculeons
1.3	Abridgers	6.5	Abstratum	18.5	Acuminate
1.4	Abrifle	6.6	Abstrila	19.	Acutely
1.5	Abrime	6.7	Abstrop	19.5	Adagio
1.6	Abroaches	6.8	Abstrusity	20.	Adalid
1.7	Abrogable	6.9	Absuatum	20.5	Adamite
1.8	Abroma	7.	Absume	21.	Addendum
1.9	Abrooding	7.1	Absuper	21.5	Addicted
2.	Abruption	7.2	Absurdity	22.	Additament
2.1	Abrural	7.3	Absurdly	22.5	Additory
2.2	Abrus	7.4	Absuress	23.	Addlings
2.3	Abrustate	7.5	Abtisco	23.5	Adenoid
2.4	Abscess	7.6	Ababus	24.	Adequately
2.5	Abscission	7.7	Abudena	24.5	Adherent
2.6	Absconder	7.8	Abuffa	25.	Adhibit
2.7	Absent	7.9	Abugas	25.5	Adject
2.8	Absintat	8.	Abugetry	26.	Adjoining
2.9	Absippo	8.1	Abugmot	26.5	Adjunct
3.	Absisting	8.2	Abugtela	27.	Adminos
3.1	Absolo	8.3	Abuitum	27.5	Admirabunt
3.2	Absolutely	8.4	Abula	28.	Admiralty
3.3	Absolutepo	8.5	Abundance	28.5	Admirata
3.4	Absolutest	8.6	Aburius	29.	Adolescent
3.5	Absolutid	8.7	Abusage	29.5	Adolphead
3.6	Absolutist	8.8	Abuseful	30.	Adonic
3.7	Absolutory	8.9	Abusers	30.5	Adoptive
3.8	Absolvabum	9.	Abusing	31.	Adrialt
3.9	Absolvata	9.1	Abusita	31.5	Adrianus
4.	Absolvers	9.2	Abusively	32.	Adscript
4.1	Absomex	9.3	Abusocus	32.5	Adulterant
4.2	Absomites	9.4	Abusy	33.	Adventist
4.3	Absona	9.5	Abusydos	33.5	Adverbial
4.4	Absonous	9.6	Abuttess	34.	Advocate
4.5	Absonoyed	9.7	Abutely	34.5	Affa
4.6	Absoplay	9.8	Abuthal	35.	Affecting
4.7	Absorat	9.9	Abutmenes	35.5	Afferent
4.8	Absorbable	10.	Abuttal	36.	Affiche
4.9	Absorbalo	10.5	Acacy	36.5	Affinage
5.	Absorbasta	11.	Acadera	37.	Affirmer
5.1	Absorbefo	11.5	Acarus	37.5	Afflatus
5.2	Absornat	12.	Accordable	38.	Affluency
5.3	Absorpt	12.5	According	38.5	Afforage
5.4	Absorptive	13.	Accumbent	39.	Afforest
5.5	Abstaffo	13.5	Acetal	39.5	Affret
5.6	Abstemious	14.	Acheron	40.	Affrighter

Code—Millimeter Sizes

(Continued)

Size	Code	Size	Code	Size	Code
40.5	Affusible	54.5	Ajack	68.5	Alhall
41.	Afloat	55.	Ajarax	69.	Alhambert
41.5	Afreet	55.5	Ajuging	69.5	Alibone
42.	Afric	56.	Akletta	70.	Aliding
42.5	Agatesci	56.5	Alacade	70.5	Alienate
43.	Agathy	57.	Alalite	71.	Aligned
43.5	Agect	57.5	Alamine	71.5	Alkaline
44.	Agedena	58.	Alary	72.	Allegate
44.5	Agency	58.5	Alaster	72.5	Allegating
45.	Agidae	59.	Albanian	73.	Allegged
45.5	Agileness	59.5	Albed	73.5	Allegrotes
46.	Agin	60.	Albescent	74.	Allenting
46.5	Agistment	60.5	Albinister	74.5	Alleyed
47.	Aglaia	61.	Alborak	75.	Alloper
47.5	Agnate	61.5	Alcat	75.5	Alloying
48.	Agnomen	62.	Alcoran	76.	Allumen
48.5	Agonize	62.5	Alder	77.	Almelite
49.	Agrarian	63.	Aldermanic	78.	Almoose
49.5	Aground	63.5	Aldoon	79.	Alnathy
50.	Aguetree	64.	Aleak	80.	Aloha
50.5	Ahold	64.5	Aleman	81.	Alpaca
51.	Aikraw	65.	Aleroom	82.	Alpetre
51.5	Ailure	65.5	Aless	83.	Already
52.	Airborn	66.	Alfoy	84.	Alsoran
52.5	Airhill	66.5	Alfster	85.	Altogether
53.	Airling	67.	Algaman	90.	Amassive
53.5	Airshot	67.5	Algerilial	95.	Ametrical
54.	Aisled	68.	Algerless	100.	Amorning

Code—Number Sizes

Size	Code	Size	Code	Size	Code
000	Abstoady	15	Absonult	32	Absist
00	Abstivial	16	Absonoy	33	Absinthis
0	Abstides	17	Absonatus	34	Absinthian
1	Abstergent	18	Absonage	35	Absenters
2	Abstention	19	Absomul	36	Absentator
3	Abstade	20	Absomalia	37	Absence
4	Absorption	21	Absolvitor	38	Abscondent
5	Absoros	22	Absolved	39	Abscond
6	Absorbing	23	Absolvax	40	Abscisses
7	Absorbegg	24	Absolvasti	41	Abscind
8	Absorbed	25	Absolvabo	42	Abrye
9	Absorbarl	26	Absolutus	43	Abrusor
10	Absorbams	27	Absolutiva	44	Abruro
11	Absorbak	28	Absolutigo	45	Abruptness
12	Absorbagum	29	Absolutex	46	Abruptly
13	Absoquil	30	Absolutem	47	Abrupting
14	Absopris	31	Absitum	48	Abrooks

Code—Number Sizes

(Continued)

Size	Code	Size	Code	Size	Code
49	Abrood	60	Abrequest	71	Abraumery
50	Abrogation	61	Abrenoy	72	Abraumed
51	Abrogate	62	Abrenowt	73	Abraum
52	Abroad	63	Abrenounce	74	Abrater
53	Abrital	64	Abreheal	75	Abrasion
54	Abrief	65	Abreddy	76	Abrase
55	Abridgment	66	Abreasute	77	Abranch
56	Abricock	67	Abray	78	Abraid
57	Abreuvoir	68	Abraxas	79	Abrahamman
58	Abretail	69	Abravos	80	Abrahamic
59	Abresto	70	Abraviat		

Code—Letter Sizes

Size	Code	Size	Code	Size	Code
A	Abstersiv	J	Absumption	S	Abusena
B	Abstir	K	Absurata	T	Abusingly
C	Abstorso	L	Absurdness	U	Abusual
D	Abstract	M	Abtalma	V	Abutable
E	Abstracters	N	Abudding	W	Abutilon
F	Abstrego	O	Abugler	X	Abvolate
G	Abstringe	P	Abuhata	Y	Aby
H	Abstrusely	Q	Abulites	Z	Abyssal
I	Absuit	R	Abusable		

Code—Miscellaneous Sizes

Size	Code	Size	Code	Size	Code
0 to 1	Arabel	1½ to 4	Architect	4 to 5	Argentine
0 " 2	Arabia	1½ " 5	Archives	4 " 6	Argillous
0 " 3	Araby	2 " 1	Archness	5 " 3	Argonaut
½	Arapaho	2 " 2	Arcograph	5 " 4	Argosy
½ " 1	Arbiter	2 " 3	Arctic	5 " 5	Argue
½ " 2	Arbitrate	2 " 4	Arcuate	5 " 6	Argument
½ " 3	Arboreal	2 " 5	Arcular	5A	Ariack
½ " 4	Arbutus	3 " 1	Ardent	6A	Ariad
1 " 1	Arcade	3 " 2	Ardor	7A	Ariadne
1 " 2	Arcanum	3 " 3	Arduous	7B	Aridity
1 " 3	Arch	3 " 4	Area	8A	Aright
1 " 4	Archaic	3 " 5	Areaway	8B	Arisen
1 " 5	Archangel	3 " 6	Arena	9A	Aristocrat
1½ "	Archduke	4 " 2	Areolar	9B	Arithmetic
1½ " 2	Archery	4 " 3	Areopagus	9C	Armadillo
1½ " 3	Archfiend	4 " 4	Argal		

Code—Tools Listed by Number Sizes

No. 05—Drill Case Drawers—see page 71

Size	Code Word	Size	Code Word
No. 1	Paas	No. 4	Pabar
2	Paaser	5	Pabarite
3	Paball	6	Pabcull

No. 62A—Floating Tool Holders, with Taper Shanks—see page 178

Code Word—Labadpin For Sizes see page 233

No. 62B—Floating Tool Holder fitted to Turret Tool Holders—see page 178

Code Word—Labadpot For Sizes see page 232

No. 70—Turret Tool Holders—see page 177

Size	Code Word	Size	Code Word
No. 1	Pablea	No. 3	Pabline
2	Pablent		

No. 72—Collets for Turret Tool Holders—See page 177

Size	Code Word	
No. 1	Pablist	For Diameter of Holes in Collet Refer to Code Words for Diameters, page 229.
2	Pablock	
3	Pablode	

No. 75—Two Jawed Grip Chucks, with Rough Shanks—see page 31

Size	Code Word	Size	Code Word
No. 0	Pacifier	No. 1½	Pack
½, ⅛ to ½ in	Pacify	2	Packard
1, ⅛ to ¾ in	Pacing		

No. 77—Two Jawed Grip Chucks, with Taper Shanks—see page 31

Size			Code Word	Size			Code Word
No. 0	No. 1	Taper Shank	Packcloth	No. 1	No. 4	Taper Shank	Pad
0	2	"	Packduck	1½	3	"	Padding
½	1	"	Packing	1½	4	"	Paddle
½	2	"	Packman	1½	5	"	Paddock
½	3	"	Packwax	2	3	"	Paddy
1	2	"	Paco	2	4	"	Padnag
1	3	"	Paction	2	5	"	Pagan

No. 78—Patent Arbors, with Straight Shanks—see page 111

Code Word—Labadsign For Sizes refer to Code Words for Number Sizes page 232

No. 79—Patent Arbors, with Taper Shanks—see page 111

Code Word—Labadsilk For Sizes refer to Code Words for Number Sizes page 232

No. 81—"Perfect Double-Tang" Sleeves—see page 24

Use word "Dubtang" following code word for proper size of list No. 104, see page 236

No. 82—"Perfect Double-Tang" Fitted Socket—see page 25

Use word "Dubtang" following code word for proper size of list No. 102, see page 236

No. 83—"Perfect Double-Tang" Rough Socket—see page 25

Use word "Dubtang" following code word for proper size of list No. 100, see page 235

"Perfect Double-Tang" Shanks on any Regular Tool—see page 23

Use word "Dubtang" following code word for list number of tool desired

For Code Words for Sets, see Pages 10, 11
For Code Words for Tools, See Pages 11-17

Code—Tools Listed by Number Sizes

No. 85—Cleveland Combination Counterbores—see page 186

Size No. 1	No. 1 Taper Shank	Code Word	Size No. 3	No. 4 Taper Shank	Code Word
1	2 "	.Paganism	4	4 "	.Pagehood
2	2 "	.Paganize	4	5 "	.Pageless
2	3 "	.Paganly	5	5 "	.Paginal
3	3 "	.Page	5	6 "	.Pagoda
		.Pageant			.Paigle

No. 88—Cutters for Grooving Taper Shanks—see page 29

Size	Code Word	Size	Code Word
No. 1	.Paigom	No. 4	.Paigowls
2	.Paigool	5	.Paiguns
3	.Paigost		

No. 89A—Cleveland Improved Grip Sockets, with Rough Shanks—see page 28

Size	Code Word	Size	Code Word
No. 1	.Pail	No. 4	.Paining
2	.Pailful	5	.Painless
3	.Painable		

No. 89B—Cleveland Improved Grip Sockets, with Fitted Shanks—see page 28

Size No. 1	No. 2 Taper Shank	Code Word	Size No. 2	No. 5 Taper Shank	Code Word
1	3 "	.Paint	3	4 "	.Palacious
1	4 "	.Painter	3	5 "	.Paladin
1	5 "	.Paintress	4	5 "	.Palatal
2	3 "	.Pairer	5	6 "	.Palate
2	4 "	.Pal			.Palatic
		.Palace			

No. 92A—Cleveland Oil Feeding Sockets, with Rough Shanks —see page 30

Size	Code Word	Size	Code Word
No. 1	.Palet	No. 4	.Palewise
2	.Paletot	5	.Palfrey
3	.Palette		

No. 92B—Cleveland Oil Feeding Sockets, with Fitted Shanks —see page 30

Size No. 1	No. 2 Taper Shank	Code Word	Size No. 3	No. 4 Taper Shank	Code Word
1	3 "	.Palisade	4	5 "	.Pallid
2	3 "	.Palitin	5	6 "	.Palling
		.Pallial			.Pallmall

No. 94—Drill Holders—see page 22

Size	Code Word	Size	Code Word
No. 1	.Pallor	No. 3	.Palmar
2	.Palm	4	.Palmate

No. 100—Rough Sockets—see page 20

Size	Code Word	Size	Code Word
No. 1	.Palmine	No. 4	.Palmoil
2	.Palmiped	5	.Palmoine
3	.Palmistry	6	.Palp

For Code Words for Sets, See Pages 10, 11
For Code Words for Tools, See Pages 11-17

Code—Tools Listed by Number Sizes

No. 102—Fitted Sockets—see page 20

Size	Code Word	Size	Code Word
No. 1 to 2	Palpable	No. 3 to 4	Palsgrave
1 to 3	Palpablist	3 to 5	Palsgrieve
1 to 4	Palpablot	4 to 3	Palsgrown
1 to 5	Palpablue	4 to 4	Palsibyl
2 to 3	Palpiform	4 to 5	Palsical
2 to 4	Palpihood	4 to 6	Palside
2 to 5	Palpikeel	5 to 4	Palsilt
3 to 2	Palpilim	5 to 5	Palsinster
3 to 3	Palpimine	5 to 6	Palster

No. 104—Sleeve or Shell Sockets—see page 21

Size	Code Word	Size	Code Word
No. 1 to 2	Paludal	No. 2 to 5	Panadall
1 to 3	Pampas	3 to 4	Panado
1 to 4	Pamper	3 to 5	Panadorf
1 to 5	Pampered	4 to 5	Panary
2 to 3	Pampering	4 to 6	Panarest
2 to 4	Panacea	5 to 6	Pancake

No. 105—Drifts or Center Keys—see page 21

Size	Code Word	Size	Code Word
No. 1	Pancall	No. 3	Pancomber
2	Pancold	4	Pancords

No. 133—Arbors for Shell Reamers—see pages 112, 150

Size	Code Word	Size	Code Word
No. 3	Pandal	No. 10	Pandit
4	Pandamus	11	Pandom
5	Pandar	12	Pandores
6	Pandaring	13	Pandorset
7	Pandean	14	Pandours
8	Pandect	15	Pandowdy
9	Pandemic		

No. 133A—Arbors for Shell Reamers, with Taper Shanks—see pages 112, 150

Size	Code Word	Size	Code Word
No. 3	Paneling	No. 10	Pannard
4	Pang	11	Pannast
5	Pangolin	12	Pannatly
6	Panicful	13	Pannave
7	Pannage	14	Panobet
8	Pannals	15	Panobore
9	Pannamel		

No. 137—Taper Pin Reamers—see page 132

Size	Code Word	Size	Code Word
No. 000	Panopet	No. 7	Panther
00	Panopile	8	Pantile
0	Panoply	9	Pantler
1	Panorama	10	Pantomine
2	Pansophy	11	Panton
3	Pansy	12	Pantry
4	Pantalet	13	Papacy
5	Pantess	14	Papadom
6	Panthem		

Code—Tools Listed by Number Sizes

No. 138—Half Round Reamers—see page 132

Size	Code Word	Size	Code Word
No. 000	Papier	No. 7	Papuan
00	Papilo	8	Papular
0	Papilla	9	Papulate
1	Papillary	10	Papule
2	Papillose	11	Papulife
3	Papism	12	Papyro
4	Papoose	13	Papyrotype
5	Pappus	14	Papyrus
6	Paprika		

No. 144—Socket Reamers—see page 133

Size	Code Word	Size	Code Word
No. 0	Paraclose	No. 4	Parage
1	Parade	5	Paragraph
2	Paradise	6	Paramont
3	Paradont		

No. 144A—Roughing Socket Reamers—see page 133

Size	Code Word	Size	Code Word
No. 0	Parameter	No. 4	Parasite
1	Paramo	5	Parasol
2	Paranut	6	Paravail
3	Parapet		

No. 144B—Roughing Socket Reamers—see page 133

Size	Code Word	Size	Code Word
No. 0	Parboil	No. 4	Parcenary
1	Parbuckle	5	Parcener
2	Parca	6	Parch
3	Parcel	7	Parching

No. 144C—Roughing Socket Reamers—see page 133

Size	Code Word	Size	Code Word
No. 0	Parchment	No. 4	Pardine
1	Parclose	5	Pardon
2	Pard	6	Pare
3	Pardalote	7	Paregoric

No. 195—Arbors for Shell End Mills, with Morse Taper Shanks—see page 198

Code Word—Landtasse For Sizes, see Code Words for Number and Miscellaneous Sizes pages 232 and 233

No. 196—Arbors for Shell End Mills, with Brown & Sharpe Shanks—see page 198

Code Word—Landtaster For Sizes, see Code Words for Number and Miscellaneous Sizes pages 232 and 233

No. 250—Turret Lathe Arbors, Short Set—see page 180

Size	Code Word	Size	Code Word
No. 3	Piaster	No. 8	Picador
4	Piazza	9	Picaroon
5	Pibcom	10	Picayune
6	Pibrock	11	Piccadil
7	Pica		

No. 255—Turret Lathe Arbors, Long Set—see page 180

Size	Code Word	Size	Code Word
No. 3	Piccolo	No. 8	Pickle
4	Pickens	9	Picnic
5	Pickerel	10	Picoline
6	Pickering	11	Picric
7	Picket		

For Code Words for Sets, See Pages 10, 11
For Code Words for Tools, See Pages 11-17

Code—Tools Listed by Number Sizes

No. 532—Arbors for "Peerless" Shell Reamers—see page 168
These Arbors are made the same as List No. 133 and take same Code Words See page 236

No. 533—Arbors for "Peerless" Shell Reamers, with Taper Shanks—see page 168
Code Word—Lowcab For Sizes see Code Words for Number Sizes, page 232

No. 534—Adjusting Wrenches for "Peerless" Expansion Shell Reamers—see page 172
Code Words—Lowcabin For Sizes see Code Words for Number and Miscellaneous Sizes, pages 232, 233

No. 535—"Peerless" Arbors for Expansion Shell Reamers—see page 169
Code Word—Lowcaddy For Sizes see Code Words for Number and Miscellaneous Sizes, pages 232,233

No. 536—"Peerless" Arbors for Expansion Shell Reamers, with Taper Shanks—see page 169
Code Word—Lowcalf For Sizes see Code Words for Number and Miscellaneous Sizes, pages 232,233

No. 701—"Progress" Short Sockets, Rough—see page 27
For Code Word use "Progshort" following code word for proper size of List No. 100, see page 235

No. 703—"Progress" Short Sockets, Fitted—see page 27
For Code Word use "Progshort" following code word for proper size of List No. 102, see page 236

No. 706—"Progress" Short Sleeves—see page 27
For Code Word use "Progshort" following code word for proper size of List No. 104, see page 236

"Progress" Short Shanks on any Regular Tool—see page 26
For Code Word use "Progshank" following regular code word for style of tool wanted

No. 900A—"Paragon" Centering Collets—see page 84
Code Word—Lowjabb For Sizes see Code Words for Number Sizes, page 232

No. 900B—"Paragon" Driving Collets—see page 84
Code Word—Lowjabber For Sizes see Code Words for Number Sizes, page 232

No. 901—"Paragon" Rough Sockets—see page 84
For Code Word use "Parflat" following code word for proper size of List No. 100, see page 235

No. 903—"Paragon" Fitted Sockets—see page 84
For Code Word use "Parflat" following code word for proper size of List No. 102, see page 236

No. 907—"Paragon" Sleeves—see page 84
For Code Word use "Parflat" following code word for proper size of List No. 104, see page 236

Index of Code Words